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MONTEREY, CALIFORNIA

THESIS

LOSS MEASUREMENTS IN THE ENDWALL REGION OF A CASCADE OF COMPRESSOR BLADES AT STALL

by

Marlies C. Urban

June 2006

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Flow around second-generation controlled-diffusion blades in cascade at stall was investigated using five-hole probe surveys. Wake pressure surveys were conducted at various locations between the cascade centerline and endwall region. Corresponding inlet pressure surveys were also performed to allow the total pressure loss distribution to be calculated across the blades. A fully automated traverse mechanism was implemented for the probe surveys ahead of and aft of the cascade blades. The number of wake surveys conducted allowed the pressure distribution profiles to show pressure deficiencies at the endwall region in greater detail than previous studies.

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LOSS MEASURMENTS IN THE ENDWALL REGION OF A CASCADE OF COMPRESSOR BLADES AT STALL

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ABSTRACT

Flow around second-generation controlled-diffusion blades in cascade at stall was investigated using five-hole probe surveys. Wake pressure surveys were conducted at various locations between the cascade centerline and endwall region. Corresponding inlet pressure surveys were also performed to allow the total pressure loss distribution to be calculated across the blades. A fully automated traverse mechanism was implemented for the probe surveys ahead of and aft of the cascade blades. The number of wake surveys conducted allowed the pressure distribution profiles to show pressure deficiencies at the endwall region in greater detail than previous studies.

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I.   INTRODUCTION

A.   BACKGROUND

Modern aircraft designs are continuously evolving and advancing; as a consequence there is a continual need for improved engine performance. This improved performance requires smaller, lighter, more efficient engines, which lead to increased compressor blade loading and the ability to operate at a reduced stall margin.

Compressor stall results from destabilized air flow through the compressor and results in a loss of engine power. The most likely cause of stall is a sudden change in pressure differential in the aircraft engine. As a result care must be taken when dropping air speed or increasing throttle, as happens during take-off and landing. This is a primary concern for the Navy because of carrier-based take-off and landing. The need to meet these improved design requirements led to the development of controlled-diffusion blades.

Controlled-diffusion blades were specially designed to handle the necessary increase in blade loadings. Their design was based on controlling diffusion on the suction side of the blade and thereby preventing boundary layer separation. This allowed for a higher angle of incidence and a corresponding increase in blade loading. As a result fewer blades are needed and engine weight is reduced.

The controlled-diffusion blades, Stator 67B, installed in the Low Speed Cascade Wind Tunnel (LSCWT) used for this study were designed by Thomas F. Gelder of the NASA Glenn Research Center [Ref 1]. Stator 67B, along with Rotor 67, comprised compressor Stage 67. These blades were second-generation improvements of the Stator 67A blades designed by Nelson Sanger [Ref 2].

Over the past several years numerous studies have been conducted on these blades. Hansen [Ref 3] used Laser Doppler Velocimetry (LDV) and pressure probe measurements to study the flow at the design inlet flow angle of 36.6^{o}. Schnorenberg [Ref 4] studied the effects of Reynolds number on suction-side separation at an inlet flow angle of 38° with LDV and surface pressure measurements. Nicholls [Ref 5] studied the cascade flow after the replacement of the tunnel motor using surface flow visualization,

pressure measurements, and LDV. Carlson [Ref 6] was the first to investigate the spanwise distribution of losses through the cascade by extensive five-hole probe measurements aft of the blades. Caruso [Ref 7] followed this work by conducting three component LDV measurements aft of the blades. Fitzgerald [Ref 8] used LDV, surface pressure measurements and flow visualization at an inlet flow angle of 40.5^{o} to study the cascade flow at stall.

B.   PURPOSE

The objective of this study was to characterize the endwall region flow behavior of a cascade at stall at the same conditions investigated by Fitzgerald [Ref 8]. This was to be achieved by developing a fully automated traverse capability for pneumatic probes within the cascade wind tunnel. Five-hole probe measurements were performed to characterize the inlet and wake flows at a Reynolds number of 640,000. The main purpose of this study was to determine the stagnation pressure loss distribution across the compressor blades of the cascade at stall.

II.   TEST FACILITY AND INSTRUMENTATION

A.   LOW-SPEED CASCADE WIND TUNNEL

This study was conducted in the LSCWT located at the Naval Postgraduate School's Turbopropulsion Laboratory. Figure 1 shows the schematic of the cascade in the Low Speed Turbomachinery Building. All aspects of the tunnel remain as previously documented by Nicholls [Ref 5].
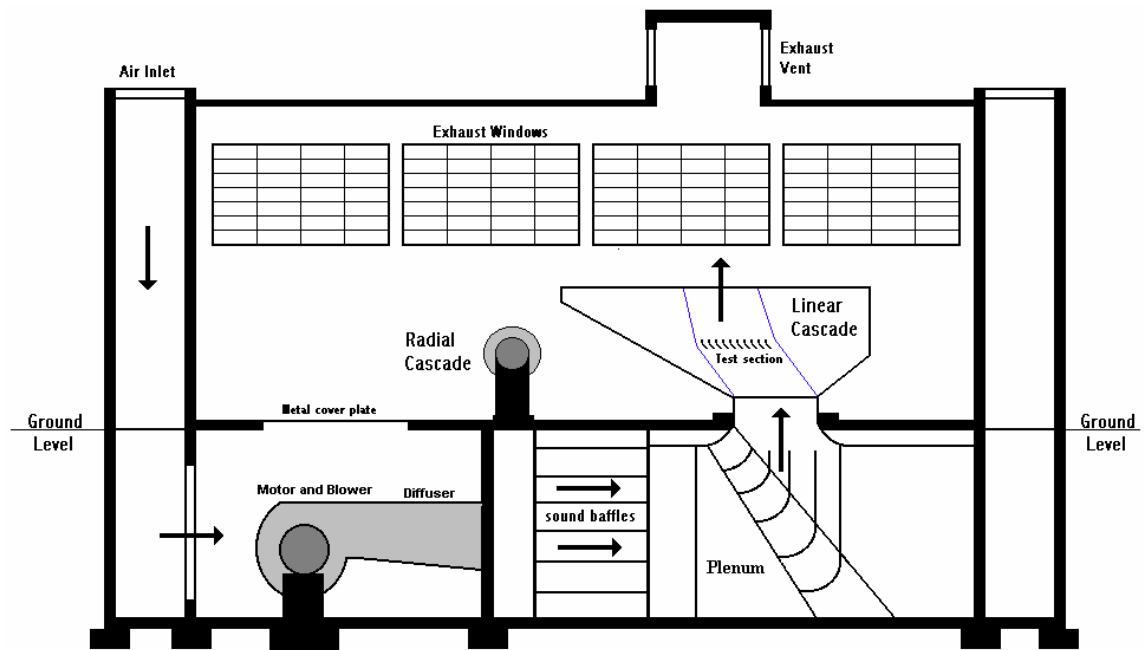
Figure 1.   NPS Low-Speed Cascade Wind Tunnel [From Ref 5]

B.   TEST SECTION

The test section of the LSCWT contained ten Stator 67B controlled-diffusion (CD) blades. The installation of the test section blades was documented by Hansen [Ref 3]. A detailed layout of the test section is shown in Figure 2.
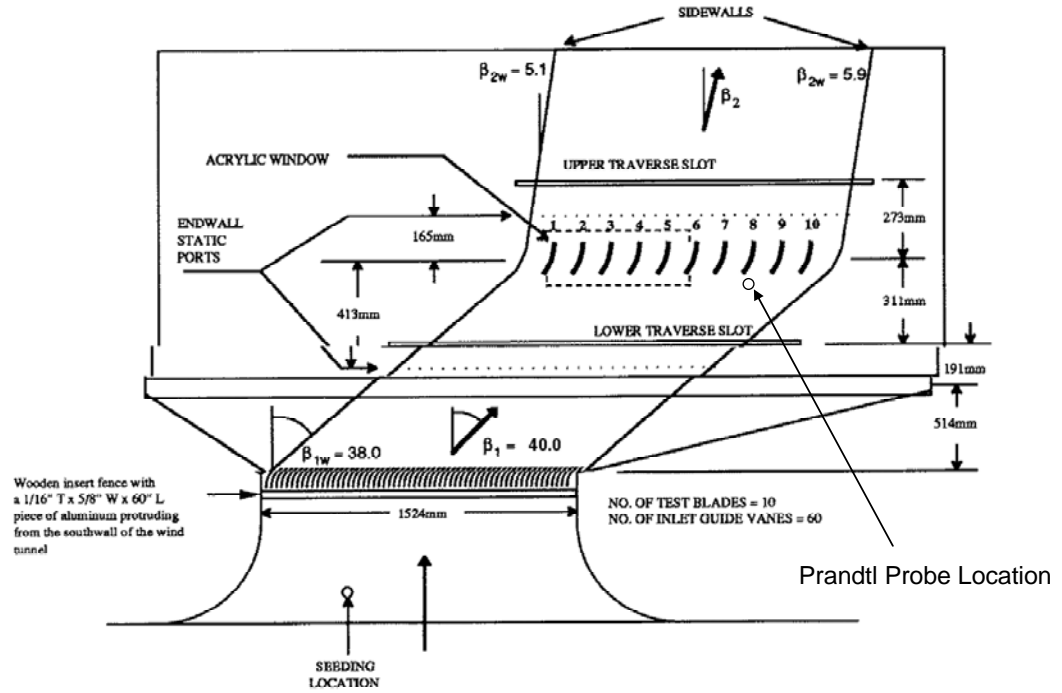
Figure 2.   Test section schematic [From Ref 5]

The mid-span section of Stator 67B was used to scale the blades [Ref 1].   The coordinates used to machine the blades were documented by Hansen [Ref 3]. Each blade had a span of 234 mm, a chord of 127.25 mm, and blade spacing was set to 152.4 mm. The blade profile for the Stator 67B blade can be seen in Figure 3.
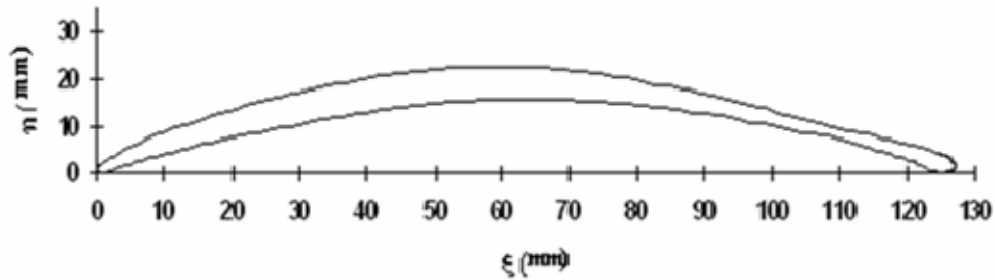
Figure 3.   Stator 67B blade profile [From Ref 5]

Five-hole probe pressure measurements were taken across the passage between blades 3 and 4. Surveys in the wake region were taken in the upper transverse slot while those for the inlet region were taken in the lower transverse slot as shown in Figure 4.

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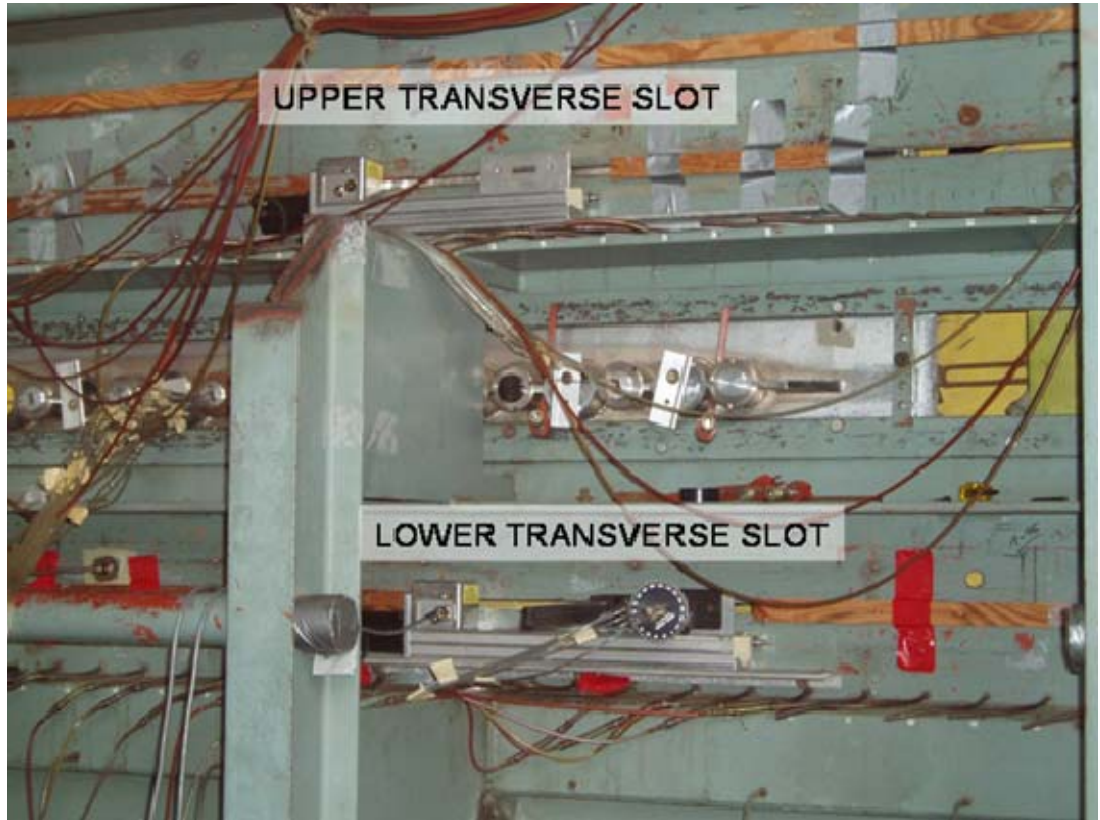
Figure 4.   Transverse slot locations on the south side of the LSCWT

C.   FIVE-HOLE PROBE INSTRUMENTATION

Pressure surveys were performed to characterize the wake flow of the blades and inlet flow surveys were conducted to determine pressure loss across the blades.

1.   Five-Hole Probe

The pressure surveys were conducted using a five-hole pressure probe to transverse the passage between blades 3 and 4. The probe used was a United Sensor conical five-hole probe with a probe diameter of 3 mm and a port size of 0.1 mm shown in Figure 5.

Calibration of this probe was conducted using the procedure outlined in Appendix A. As a result of this calibration procedure the probe was used in a non-yawed mode and thus did not require null yawing at each position prior to recording pressure measurements.

The MATLAB code, 'fpsurveys.m', used to analyze the pressure survey data was documented by Carlson [Ref 6].

Figure 5.   United Sensor conical five-hole probe

2.   Traverse Mechanism

The VELMEX Stepping Motor Controller and the UNISLIDE Motor Driven Assembly were used for programmable and precise placement of the five-hole probe during surveys. The NF90 Stepping Motor Controller had two modes of operations, 'stand alone' and 'interactive mode'. A three wire RS-232 serial port was used to communicate with the controller, allowing the user to enter commands and poll for status or position indication. Further detail concerning the operation of the NF90 motor controller can be found in Reference 9. The UNISLIDE Motor Drive Assembly used was the MB2512P40J model. The lead screw parameters for this model are shown in Table 1. This traverse mechanism was controlled by an HP-VEE program run on a personal computer.

Table 1.   UNISLIDE Lead Screw Parameters [From Ref 10]

UNISLIDE Lead Screw	Advance / Revolution	Advance / Step
P40, C	0.025 inches	0.0000625 inches

3.   Data Acquisition

The pressure survey data were recorded using the HP75000 Series B VXI-Bus Mainframe controlled by HP-VEE software running on a personal computer. The HP-VEE program, 'transverse_probe', used to control the 48-channel Scanivalve rotary pressure scanning system is documented in Appendix C. The Scanivalve channels assigned in the program are listed in Appendix B. Figure 6 shows the front panel of the 'transverse_probe' used to control the traverse mechanism and acquire the pressure readings from the Scanivalve.
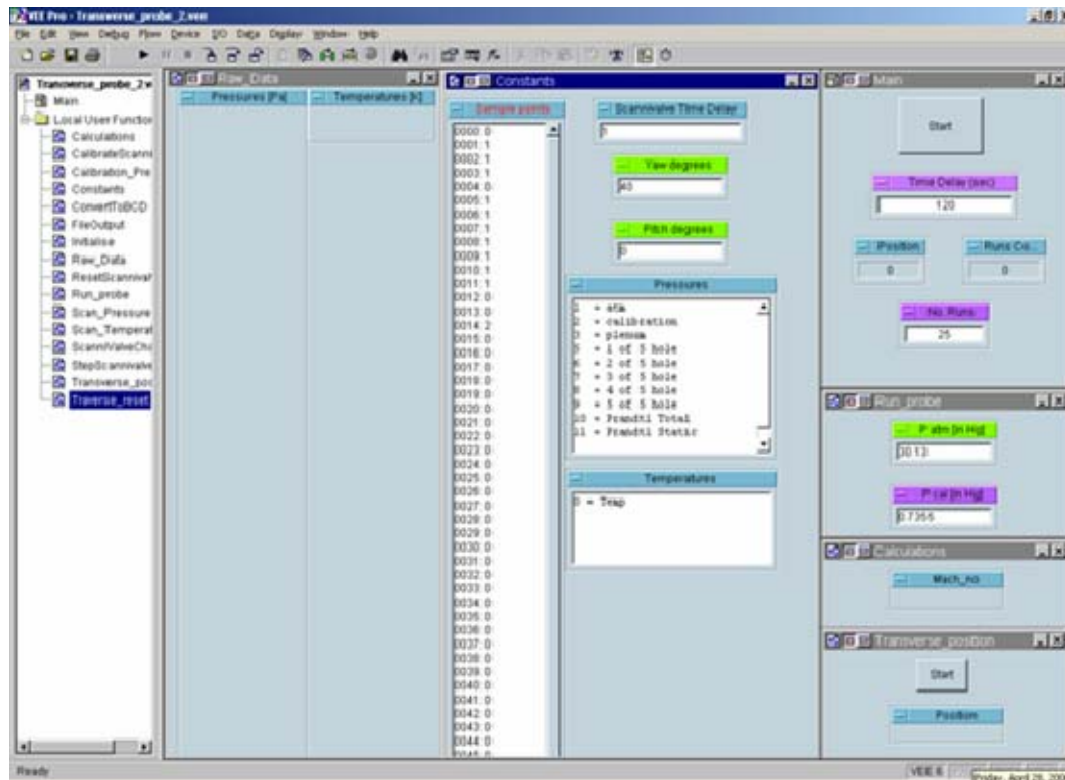
Figure 6.   Front Panel Display for 'Transverse_Probe' Program

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III. EXPERIMENTAL PROCEDURE

A. PRESSURE SURVEYS

The wind tunnel was run at a plenum gage pressure of 305 mm (12 inches) of H_2O which corresponded to a Reynolds number of 640,000 and an inlet freestream Mach number of 0.22.

1. Inlet Region

The five-hole probe was mounted on the traverse mechanism in the lower traverse slot of the tunnel (Figure 4) and was set for a yaw angle of 40 degrees. This yaw angle was the required angle to match the average yaw angle of the inlet flow. Due to the smooth nature of the inlet flow, a relatively coarse survey grid was acceptable. Therefore, of the 17 survey locations listed in Table 2, inlet surveys were performed at only the odd numbered locations. Survey runs were conducted by aligning the probe with the inlet of blade 4 and traversing across to blade 3. The surveys were run using the HP-VEE program 'traverse_probe'. Operating instructions and program layout are included in Appendix C.

Table 2.   Spanwise Survey Locations

SPANWISE LOCATION #	FRACTIONAL SPANWISE LOCATION (Z/H)	DISTANCE FROM CENTERLINE (INCHES)
1	0.500000	0.0
2	0.450000	0.5
3	0.400000	1.0
4	0.350000	1.5
5	0.300000	2.0
6	0.250000	2.5
7	0.200000	3.0
8	0.173438	3.26
9	0.146875	3.53
10	0.121875	3.78
11	0.096875	4.03
12	0.071875	4.28
13	0.046875	4.53
14	0.034375	4.66
15	0.021875	4.78
16	0.015625	4.84
17	0.009375	4.91

Each survey consisted of 25 survey positions equally space at 6.35 mm (¼ inch) intervals across the 152 mm (6 inch) pitch between the blades. After the probe was positioned at each survey point a two minute time delay was used to allow pressures to stabilize in the tubing between the probe and Scanivalve before readings were taken. The data collected was saved to an EXCEL spreadsheet for later calculations.

2. Wake Region

The wake region surveys were carried out in a similar manner to the inlet region surveys. These surveys were run with the five-hole probe mounted on the traverse mechanism on the tunnel's upper slot. Wake surveys were run at all 17 survey locations shown in Figure 2 to obtain a more detailed flow characterization. For the wake surveys a yaw angle of ten degrees was used. This yaw angle was determined by Carlson [Ref 6] as the necessary angle to measure a mean flow angle of zero degrees at the centerline. Data were also saved to an EXCEL spreadsheet for off-line reduction.

IV. RESULTS AND DISCUSSION

Wake and inlet region five-hole probe surveys were conducted across a single blade passage at a Reynolds number of 640,000. A total of 25 equispaced pitchwise data points were taken for each survey. Inlet surveys were taken at every other survey locations given in Table 2, for a total of nine, due to the relatively uniform nature of the inlet flow. Wake surveys were taken at all 17 locations between the centerline and the northern wall to allow for full characterization of the flow. Loss coefficients were calculated for each survey using the formulas given in Appendix D. Due to the unequal number of upstream and downstream surveys, stagnation pressure coefficient values for the even numbered inlet surveys were determined by averaging survey values on either side.

In the survey plots, y is the pitchwise (blade-blade) displacement and S is the blade-blade spacing (six inches).

A. INLET SURVEYS

The upstream inlet surveys resulted in curves of the coefficient of stagnation pressure, Cpt1, which was defined as the ratio of total upstream pressure (P1=Pt1) to inlet total pressure measured by the Prandtl probe. Distributions for centerline non-dimensional pressure, velocity, and pitch and yaw angles sensitivity are shown in Figures 7-9. Plots for the additional eight inlet surveys are given in Appendix E. Reduced data for all nine inlet surveys are given in Appendix F.
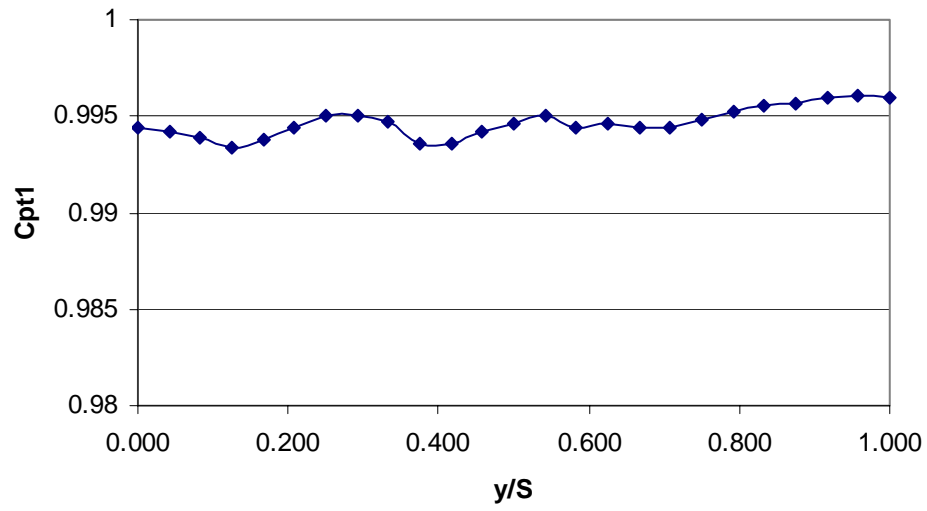
Figure 7.   Non-dimensional pressure distribution in the blade inlet at midsection
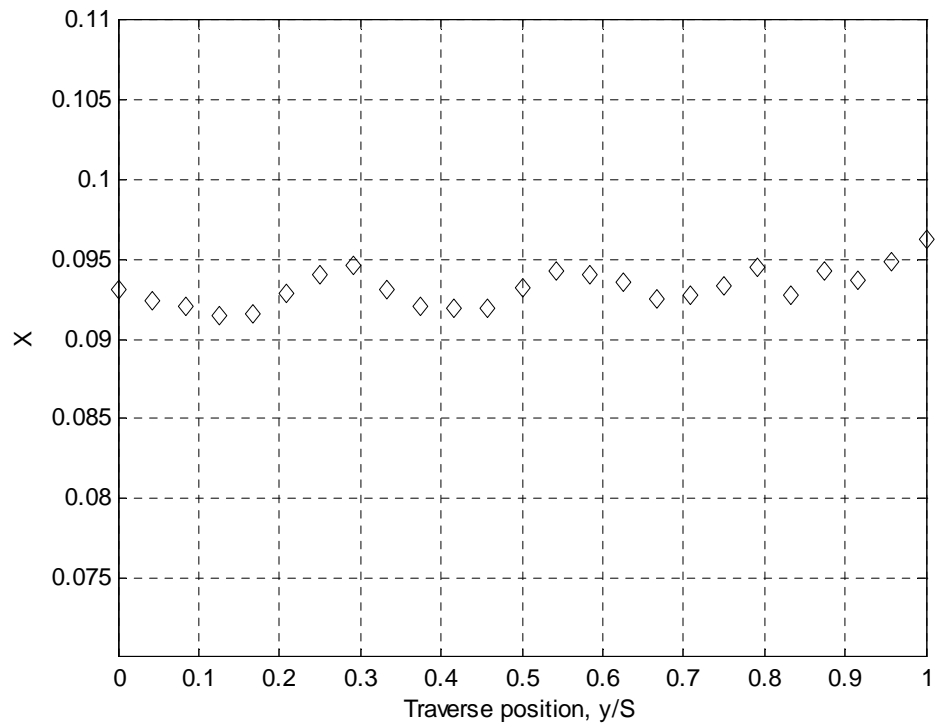
Figure 8.   Non-dimensional velocity (X) distribution in the blade inlet at midspan

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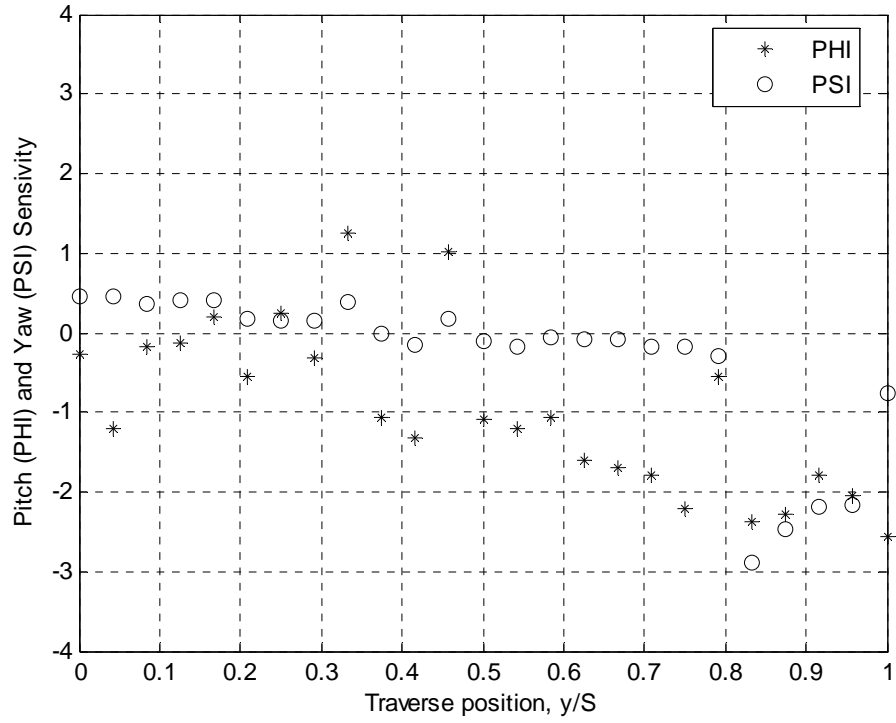
Figure 9.   Pitch (PHI) and Yaw (PSI) angle in the blade inlet at midspan

A summary surface plot of non-dimensional pressure distribution, Cpt1, from the centerline (z/h = 0) to the endwall region is shown in Figure 10. Figure 11 shows a summary surface plot of non-dimensional velocity and secondary flow. In both of these plots the effect of inlet-guide-vane tip leakage vortices can be seen in the strong rippling effect near the endwall region. As the flow approached the centerline this effect minimized and the flow became more uniform.

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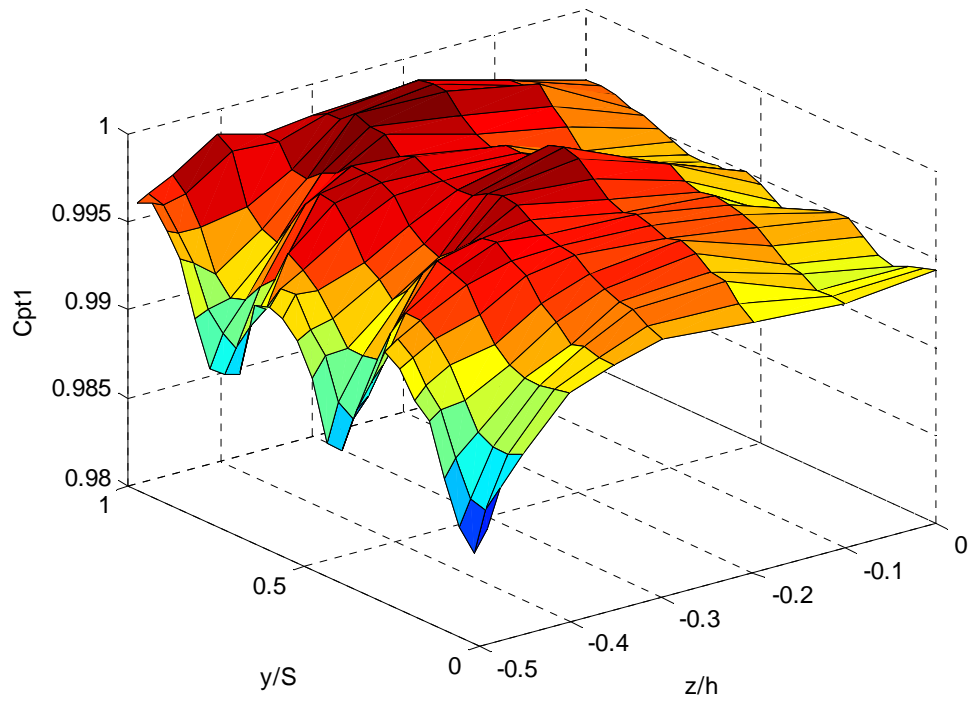
Figure 10.   Summary surface plot of non-dimensional inlet pressure distribution (Cpt1)
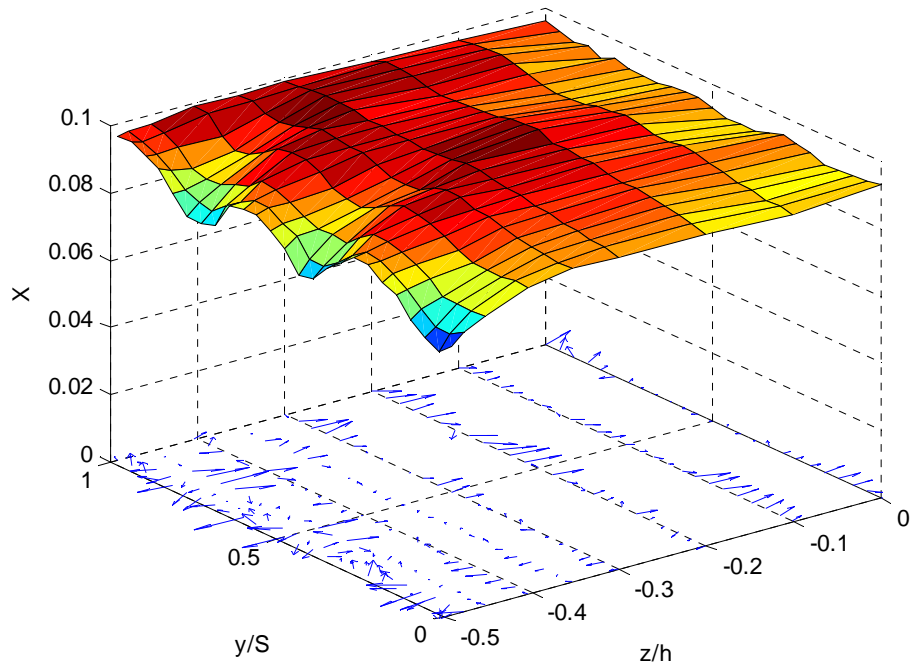
Figure 11.   Summary surface plot of non-dimensional inlet velocity and secondary flow

B.   WAKE SURVEYS

Curves for the downstream coefficient of stagnation pressure, Cpt2, were also plotted. Similar to the inlet coefficient the wake coefficient was calculated as the ratio of total downstream pressure (P1 = Pt2) to inlet total pressure measured by the Prandtl probe. The centerline non-dimensional pressure distribution, velocity distribution, and pitch and yaw sensitivity profile are shown in Figures 12-14. Curves for the additional 16 pressure surveys conducted can be found in Appendix E. Reduced data for all 17 surveys can be found in Appendix F.
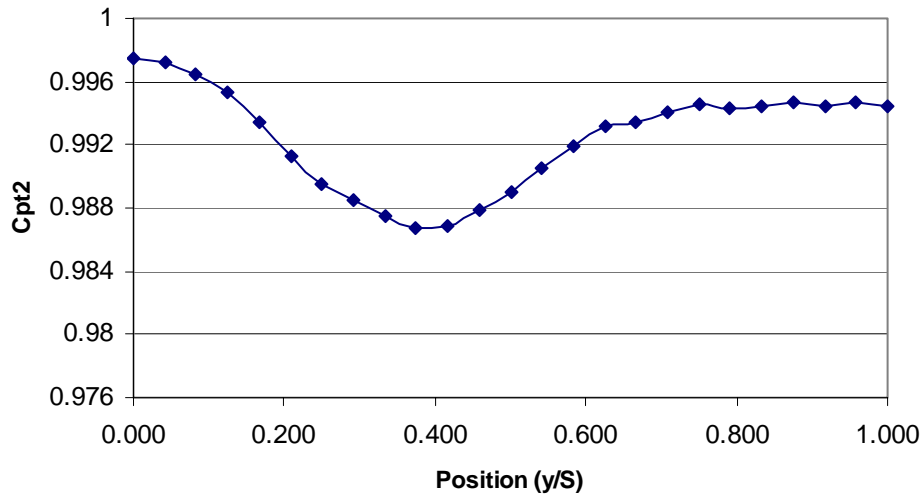
Figure 12.   Non-dimensional pressure distribution in the blade wake at midspan
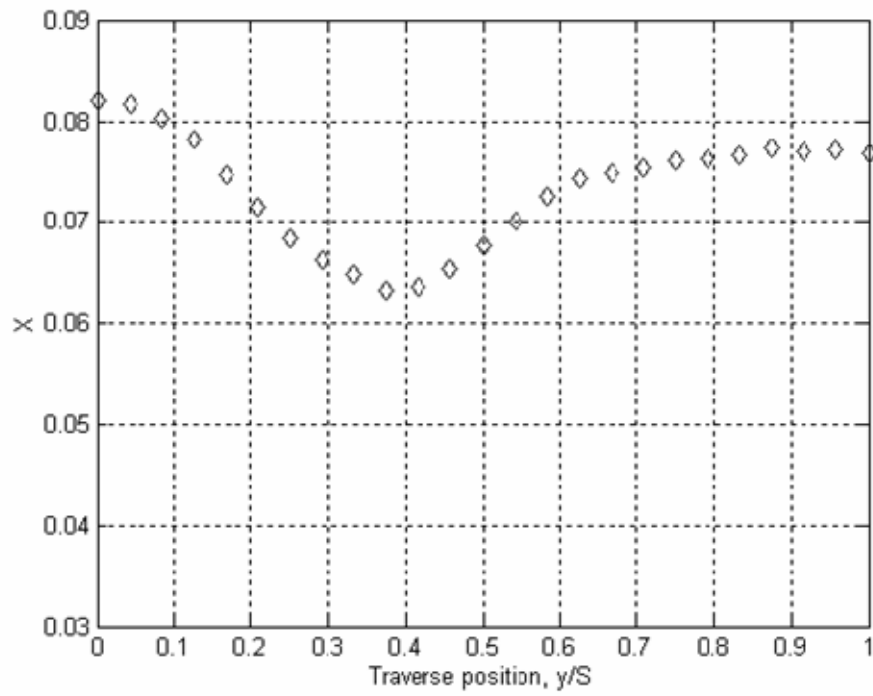
Figure 13.   Non-dimensional velocity (X) distribution in the blade wake at midspan
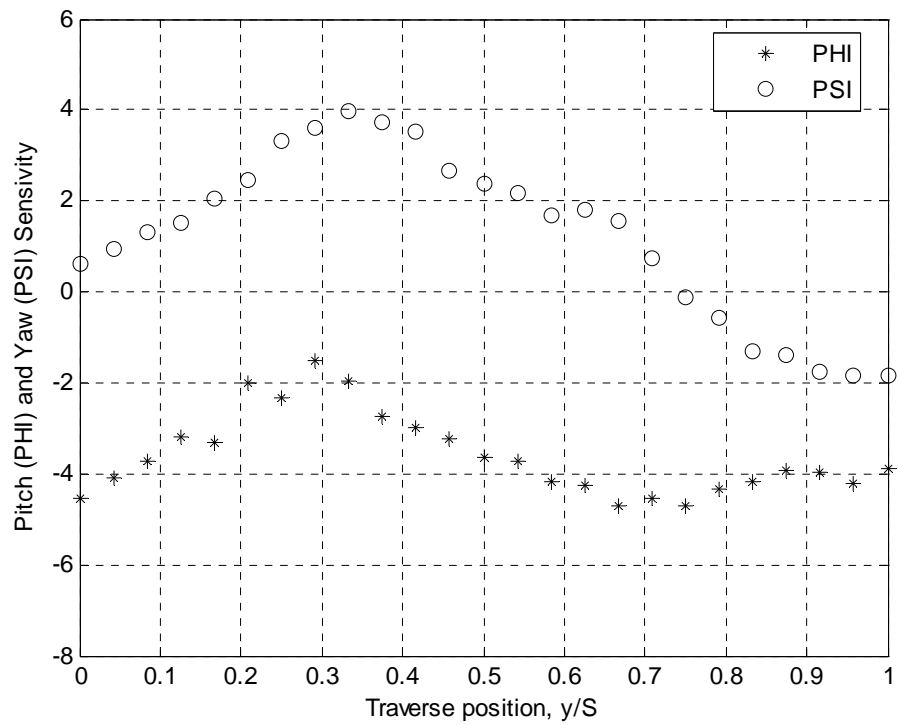
Figure 14.   Pitch (PHI) and Yaw (PSI) angle distributions in the blade wake at midspan

A summary surface plot of non-dimensional pressure distribution, Cpt2, from centerline to the endwall region is shown in Figure 15. Figure 16 shows a summary surface plot of non-dimensional velocity and secondary flow. For this plot several data points from surveys 14-17 show as low, flat regions because these data points fell outside the calibration range of the probe.

This study doubled the number of surveys taken by Carlson [Ref 6] in an effort to refine the survey grid and obtain greater detail in the endwall region over a single blade span. As a result, the total pressure and velocity deficiencies are more clearly defined, most notably in the endwall region.
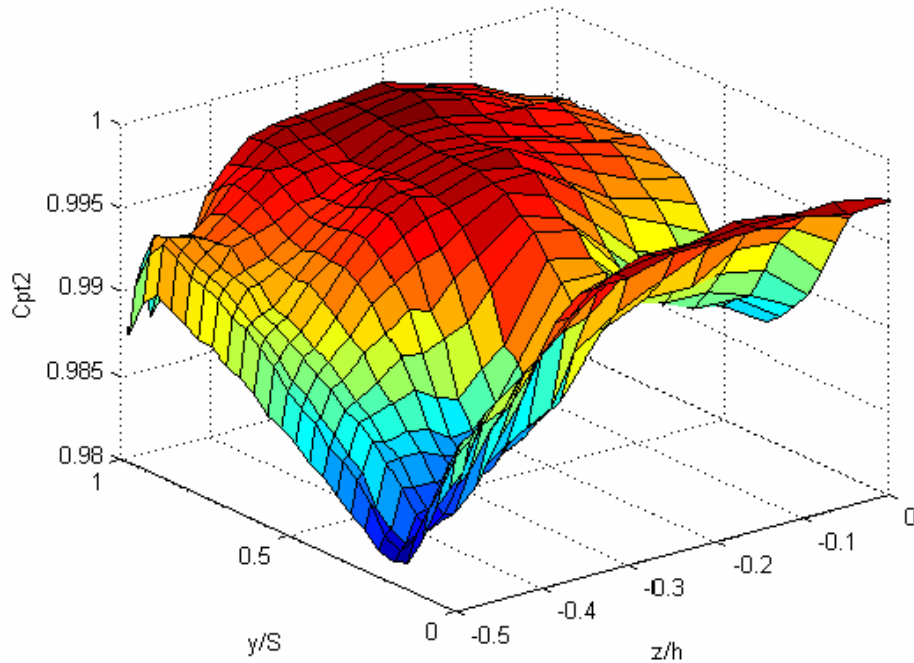
Figure 15.   Summary surface plot of non-dimensional wake pressure distribution (Cpt2)
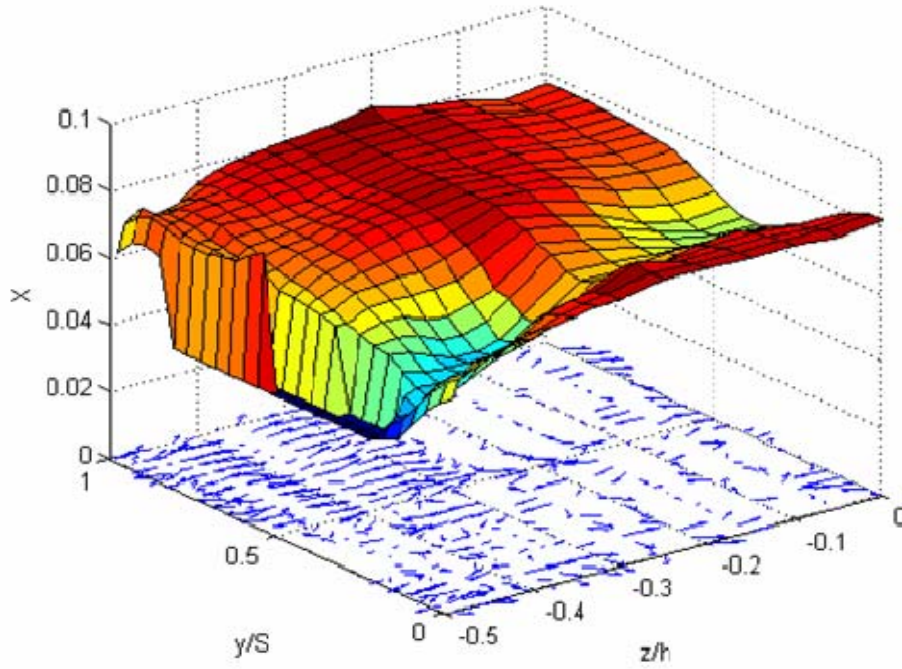
Figure 16.   Summary surface plot of non-dimensional wake velocity and secondary flow

C.   LOSS DISTRIBUTION

Using the calculations outlined in Appendix D a centerline loss coefficient of 0.2109 was calculated. The spanwise loss distribution is shown in Figure 17. Due to the increased number of survey locations, additional detail is evident in the loss distribution compared to that found by Carlson [Ref 6]. This is most notable in the endwall region where a sudden drop is evident is seen at $z/h = 0.05$.
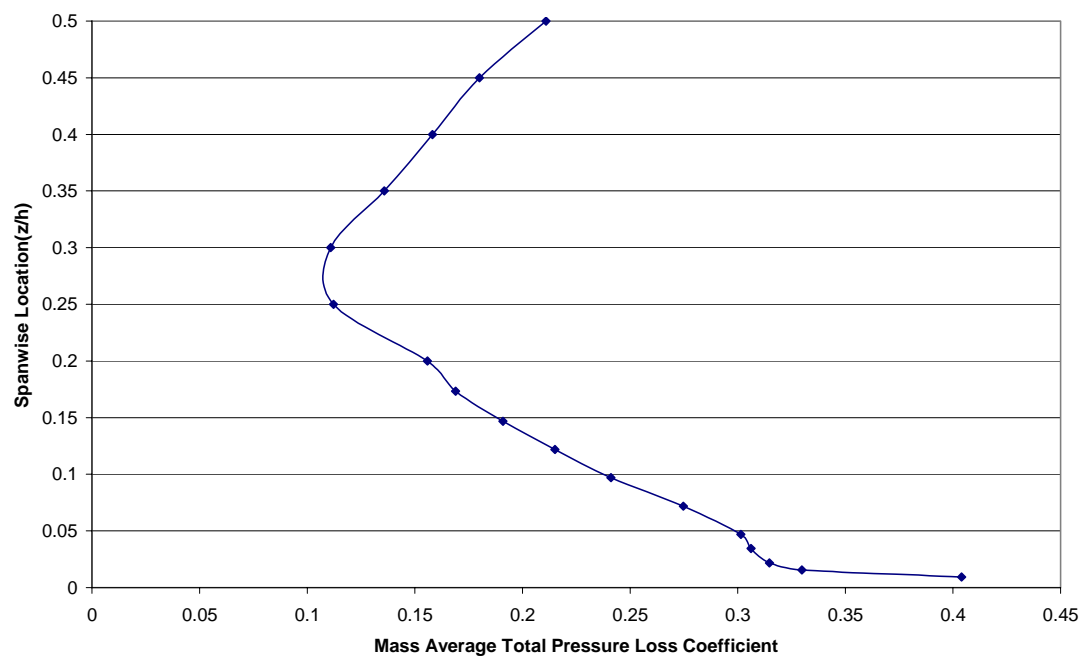
Figure 17.   Spanwise mass averaged total pressure loss distribution

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V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Second-generation controlled-diffusion compressor blades were examined at stall in the low speed cascade wind tunnel. The objectives were to examine the flow in the endwall region and measure pressure losses over the blades.

Five-hole probe pressure measurements were taken at various spanwise locations between centerline and the endwall for both blade inlet and wake flows. The plots developed of stagnation pressure distribution and total velocity distribution compared well with those from previous studies. Inlet surveys taken at various locations characterized the effect of the inlet-guide-vanes on the flow. The increase in wake survey locations from previous studies provided a more detailed view of the complexities of the wake flow. The refined flow measurements in both regions yielded more accurate spanwise total pressure loss coefficients.

A fully automated UNISLIDE traverse mechanism for probe placement was successfully implemented. Controlling the probe location with a computer program resulted in more accurate probe placement and helped improve survey repeatability.

B. RECOMMENDATIONS

The survey length was limited by the length of the UNISLIDE mechanism and this study was unable to verify that the flow retained its periodicity from blade to blade. Additional surveys should be run utilizing a longer traverse mechanism to verify the flow periodicity. CFD studies should be conducted to model the pressure coefficient distributions for comparison with the present experimental results.

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APPENDIX A: FIVE-HOLE PROBE CALIBRATION

This describes the calibration procedure for a five-hole probe for pitch and yaw variations in subsonic flow. As a result of this procedure differential flow measurements can be made without requiring yaw nulling of the probe.

A.   EQUIPMENT SETUP

The five-hole probe was calibrated in the NPS Turbopropulsion Laboratory's free jet. A schematic for the free jet is shown in Figure 18. Figure 19 figure shows the probe placement at the end of the free jet. The probe mounting assembly is shown in Figure 20. This assembly allowed for pitch and yaw to be adjusted $\pm$ 15 degrees to the flow axis.
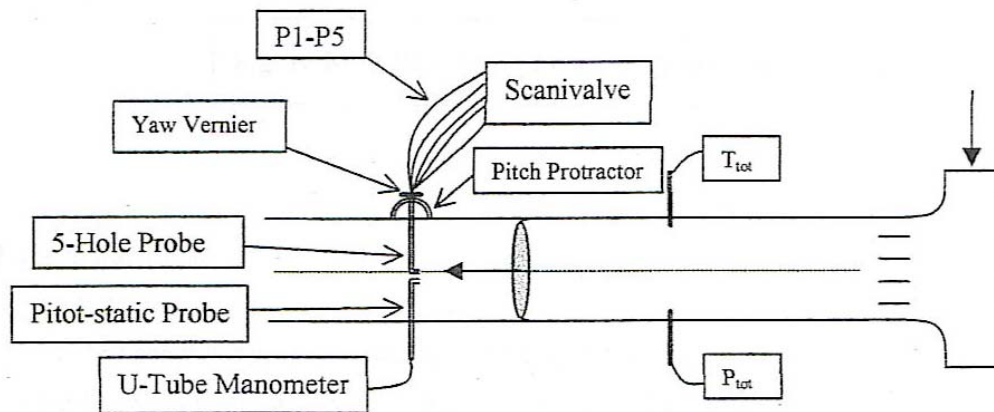
Figure 18.   NPS Turbopropulsion Laboratory Free Jet [From Ref 11]
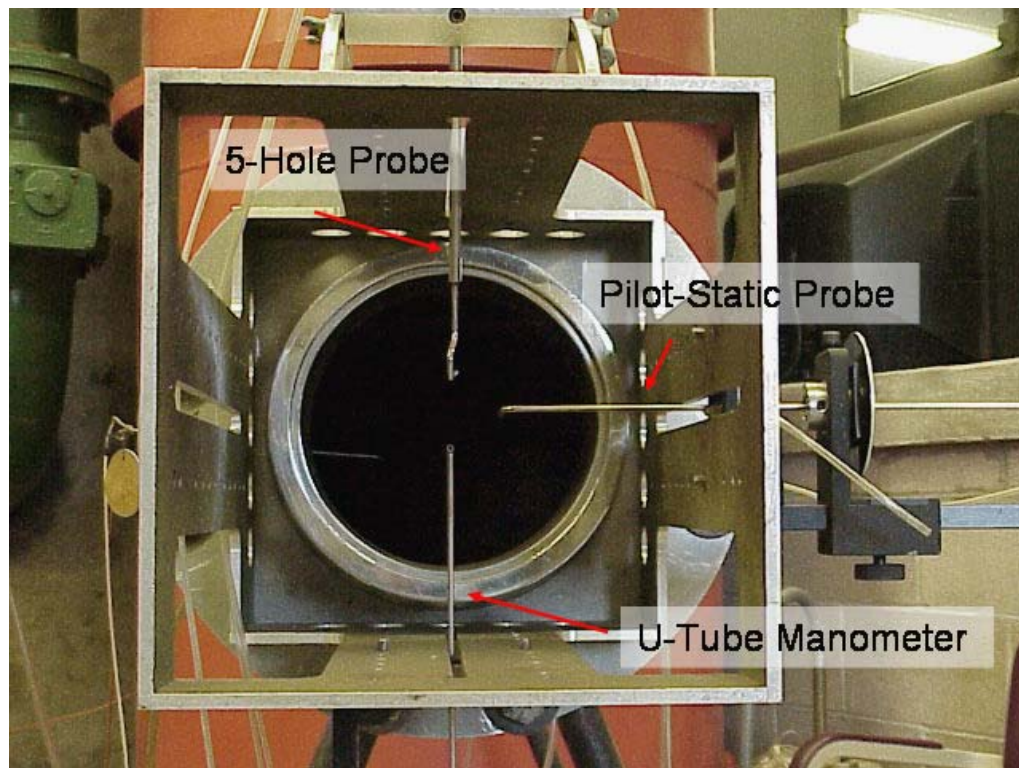
Figure 19.   Free Jet Probe Placement
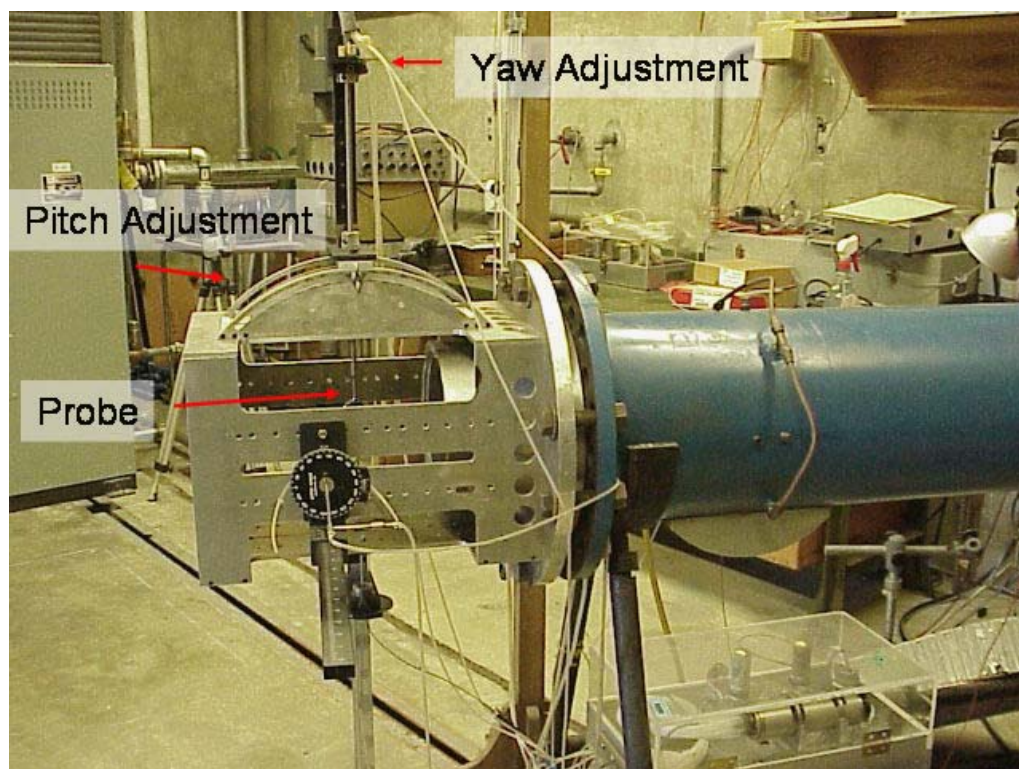
Figure 20.   Five-Hole Probe Calibration Mounting Assembly

B. DATA ACQUISITION

Calibration data were collected using the HP-VEE program '5-hole probe' to control the Scanivalve pressure scanner. This program is documented in Appendix C where '5-hole probe' is identical to the 'run_program' portion of the 'transverse_probe' program. Scanivalve channel assignments for calibration can be found in Appendix B.

C. CALIBRATION PROCEDURE

Calibration surveys were run over a Mach number range of 0.05 through 0.35 in 0.05 Mach number increments. At each Mach number the pitch was set and a sweep through the range of yaw angles, in five degree increments, was conducted. As a result an 'S' shaped survey pattern was formed. This was repeated for each pitch angle, in five degree increments, at the specified Mach number. The entire process was repeated for each Mach number. Each Mach number survey resulted in 49 possible pitch and yaw combinations.

Mach number settings were controlled by manual adjustments of air supply pressure. Prior to the start of each survey, atmospheric pressure, calibration pressure, pitch and yaw angles were entered into the front panel display of '5-hole probe' shown in Figure 21. After running the program, the actual Mach number achieved was displayed on the front panel with the Scanivalve pressure data.

This program calculated values for β, γ, and δ based on the equations shown in Appendix D. All data for each run were recorded in a text file, 'output.txt'.
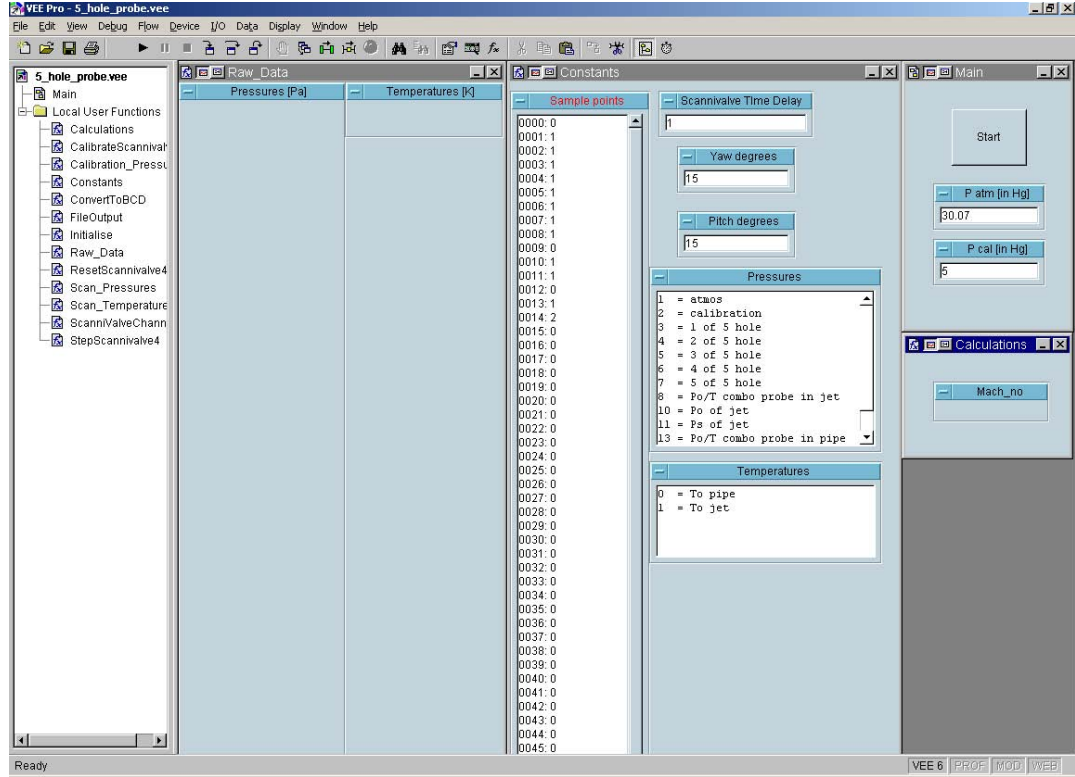
Figure 21.   '5-hole probe' front panel display

D.   CALIBRATION PROGRAMS

The MATLAB program 'calibration.m' was used to determine the calibration coefficients necessary to process the experimental data. This code was developed by students in AA3802 for their term project [Ref 11]. Modifications were made to allow for an additional Mach number of 0.05 that was needed for this study.

Raw data from the '5-hole probe' program were compiled in a reduced data file, 'reducedproj.wk1', which was used as the input file to 'calibration.m'. Upon completion, the program produced three arrays of calibration coefficients. These coefficients were calculated by solving 343 simultaneous equations once each for X, ϕ, and ψ.

$$X = \sum_{i=1}^{L}\left(\sum_{j=1}^{M}\left(\sum_{k=1}^{N} C_{ijk}\beta^{(k-1)} \right)\gamma^{(j-1)} \right)\delta^{(i-1)}$$

$$\phi = \sum_{i=1}^{L}\left(\sum_{j=1}^{M}\left(\sum_{k=1}^{N} D_{ijk}\beta^{(k-1)} \right)\gamma^{(j-1)} \right)\delta^{(i-1)}$$

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$$\psi = \sum_{i=1}^{L} \left(\sum_{j=1}^{M} \left(\sum_{k=1}^{N} E_{ijk} \beta^{(k-1)} \right) \gamma^{(j-1)} \right) \delta^{(i-1)}$$

A combination of 7 Mach numbers, yaw angles, and pitch angles were used therefore $L = M = N = 7$. Each combination of the three variables produced one equation which resulted in 343 equations to solve. Solving the equations was done using a linear algebra problem in the following form:

$$[X] = [c] * [C]$$

These were solved by:

$$[C] = [c]^{-1} * [X]$$

Coefficients for Φ and ψ were found using the same procedure.

```
*****************************************************************************
% Calibration.m [From Ref 11]
% Five-hole Probe Calibration Program
% This program reads data from a reduced data file and computes the calibration
coefficients. The calibration coefficients are then output to another data file.

%Set Initial Parameters
L=7;
M=7;
N=7;
c=zeros(343);
d=zeros(343);
e=zeros(343);

%Import Data
data=wk1read('reducedproject');
X=data(:,5);
phi=data(:,8);
psi=data(:,9);
beta=data(:,2);
gamma=data(:,3);
delta=data(:,4);

%Calculate C Calibration Coefficients
for t=1:343
  count=1;
  for i=1:L
```

```
      for j=1:M
        for k=1:N
          index(count,1)=i;
          index(count,2)=j;
          index(count,3)=k;
          c(t,count)=beta(t)^(k-1)*gamma(t)^(j-1)*delta(t)^(i-1);
          count=count+1;
        end
      end
    end
end
C=c\X;
format long
wk1write('C',C)

%Calculate D Calibration Coefficients
for t=1:343
  count=1;
  for i=1:L
    for j=1:M
      for k=1:N
        d(t,count)=beta(t)^(k-1)*gamma(t)^(j-1)*delta(t)^(i-1);
        count=count+1;
      end
    end
  end
end
D=d\phi;
format long
wk1write('D',D)

%Calculate E Calibration Coefficients
for t=1:343
  count=1;
  for i=1:L
    for j=1:M
      for k=1:N
        e(t,count)=beta(t)^(k-1)*gamma(t)^(j-1)*delta(t)^(i-1);
        count=count+1;
      end
    end
  end
end
E=e\psi;
format long
wk1write('E',E)
```

```
%Output Index for Reference
delete f:index.txt
diary f:index.txt
disp(index)
diary off
```

E. REDUCED CALIBRATION DATA

Mach No.	Beta	Gamma	Delta	X	Actual Mach No.	Total Temp (K)	Pitch (Phi)	Yaw (Psi)
0.05	0.00173	0.59572	0.68936	0.02316	0.05114	296.90781	-15	-15
0.05	0.00179	0.60083	0.46214	0.02303	0.05086	296.89609	-15	-10
0.05	0.00185	0.61001	0.25292	0.02317	0.05115	296.90781	-15	-5
0.05	0.00189	0.61506	0.05117	0.02327	0.05139	296.92930	-15	0
0.05	0.00188	0.64641	-0.14701	0.02324	0.05131	296.84238	-15	5
0.05	0.00180	0.69406	-0.35146	0.02306	0.05092	296.76523	-15	10
0.05	0.00172	0.75239	-0.57939	0.02303	0.05084	296.73008	-15	15
0.05	0.00181	0.54057	-0.56647	0.02299	0.05077	296.71543	-10	15
0.05	0.00190	0.49621	-0.34441	0.02310	0.05100	296.74766	-10	10
0.05	0.00197	0.45131	-0.14183	0.02319	0.05120	296.76719	-10	5
0.05	0.00197	0.43027	0.05163	0.02321	0.05125	296.77891	-10	0
0.05	0.00192	0.42478	0.22145	0.02325	0.05134	296.76719	-10	-5
0.05	0.00187	0.40747	0.41173	0.02303	0.05086	296.69199	-10	-10
0.05	0.00182	0.40383	0.62787	0.02316	0.05114	296.59922	-10	-15
0.05	0.00185	0.20172	0.60732	0.02316	0.05113	296.59824	-5	-15
0.05	0.00196	0.21582	0.37172	0.02320	0.05123	296.59922	-5	-10
0.05	0.00197	0.23479	0.21055	0.02325	0.05134	296.63242	-5	-5
0.05	0.00197	0.25060	0.02577	0.02300	0.05079	296.43906	-5	0
0.05	0.00201	0.26805	-0.15459	0.02324	0.05133	296.46738	-5	5
0.05	0.00196	0.28677	-0.33414	0.02308	0.05097	296.50840	-5	10
0.05	0.00187	0.31887	-0.55548	0.02309	0.05100	296.54160	-5	15
0.05	0.00190	0.12885	-0.55167	0.02310	0.05101	296.53672	0	15
0.05	0.00195	0.11066	-0.36066	0.02312	0.05106	296.47715	0	10
0.05	0.00198	0.09484	-0.17102	0.02310	0.05100	296.45957	0	5
0.05	0.00200	0.07656	0.01094	0.02296	0.05069	296.39023	0	0
0.05	0.00199	0.06360	0.18931	0.02315	0.05111	296.44785	0	-5
0.05	0.00195	0.04448	0.35838	0.02314	0.05109	296.49082	0	-10
0.05	0.00192	0.02652	0.53777	0.02318	0.05119	296.53184	0	-15
0.05	0.00191	-0.14267	0.51372	0.02309	0.05099	296.49961	5	-15
0.05	0.00196	-0.12279	0.33830	0.02322	0.05128	296.47227	5	-10
0.05	0.00198	-0.10545	0.16398	0.02312	0.05106	296.41465	5	-5
0.05	0.00196	-0.09448	0.00152	0.02323	0.05130	296.48691	5	0
0.05	0.00200	-0.07723	-0.17489	0.02306	0.05092	296.50449	5	5
0.05	0.00196	-0.06675	-0.34395	0.02305	0.05089	296.58066	5	10
0.05	0.00189	-0.04168	-0.54392	0.02320	0.05122	296.54648	5	15
0.05	0.00188	-0.24466	-0.51373	0.02317	0.05116	296.46250	10	15
0.05	0.00191	-0.25490	-0.33742	0.02303	0.05085	296.40391	10	10
0.05	0.00196	-0.25829	-0.14999	0.02307	0.05094	296.41367	10	5
0.05	0.00195	-0.26370	-0.01280	0.02324	0.05132	296.44980	10	0
0.05	0.00194	-0.29428	0.13945	0.02297	0.05073	296.45566	10	-5
0.05	0.00193	-0.30897	0.29810	0.02328	0.05141	296.50352	10	-10
0.05	0.00185	-0.33396	0.49042	0.02316	0.05115	296.52598	10	-15
0.05	0.00176	-0.47616	0.42963	0.02313	0.05108	296.53672	15	-15
0.05	0.00184	-0.47580	0.27142	0.02320	0.05123	296.49961	15	-10
0.05	0.00188	-0.45203	0.11274	0.02314	0.05109	296.42344	15	-5
0.05	0.00188	-0.44603	-0.01748	0.02303	0.05085	296.43320	15	0
0.05	0.00186	-0.43375	-0.16286	0.02305	0.05090	296.45078	15	5
0.05	0.00185	-0.42219	-0.31879	0.02308	0.05096	296.46250	15	10
0.05	0.00174	-0.41199	-0.46880	0.02323	0.05129	296.47617	15	15

Mach No.	Beta	Gamma	Delta	X	Actual Mach No.	Total Temp (K)	Pitch (Phi)	Yaw (Psi)
0.1	0.00713	-0.44956	-0.57407	0.04576	0.10113	294.14512	15	15
0.1	0.00728	-0.45860	-0.36596	0.04537	0.10026	294.57090	15	10
0.1	0.00750	-0.45286	-0.17576	0.04559	0.10075	294.82090	15	5
0.1	0.00749	-0.46698	-0.02087	0.04553	0.10061	295.12656	15	0
0.1	0.00743	-0.47811	0.12169	0.04576	0.10112	295.32090	15	-5
0.1	0.00727	-0.50573	0.29111	0.04556	0.10068	295.42539	15	-10
0.1	0.00702	-0.52496	0.49635	0.04577	0.10114	295.58945	15	-15
0.1	0.00734	-0.32387	0.50190	0.04556	0.10067	295.77695	10	-15
0.1	0.00757	-0.30632	0.30672	0.04559	0.10075	296.11875	10	-10
0.1	0.00763	-0.28811	0.13802	0.04580	0.10120	296.19883	10	-5
0.1	0.00761	-0.26643	-0.01521	0.04576	0.10112	296.19297	10	0
0.1	0.00773	-0.25771	-0.16422	0.04550	0.10056	296.15391	10	5
0.1	0.00755	-0.24539	-0.36250	0.04604	0.10174	296.27109	10	10
0.1	0.00745	-0.23616	-0.56761	0.04579	0.10118	296.38730	10	15
0.1	0.00751	-0.04744	-0.56537	0.04576	0.10113	296.54844	5	15
0.1	0.00768	-0.06478	-0.35264	0.04566	0.10090	296.74766	5	10
0.1	0.00770	-0.07931	-0.16788	0.04572	0.10103	296.64609	5	5
0.1	0.00769	-0.09359	-0.00142	0.04573	0.10106	296.69785	5	0
0.1	0.00781	-0.10952	0.16187	0.04552	0.10059	296.76816	5	-5
0.1	0.00768	-0.12689	0.33836	0.04614	0.10197	296.86973	5	-10
0.1	0.00744	-0.14381	0.53262	0.04556	0.10067	297.01719	5	-15
0.1	0.00747	0.02998	0.55972	0.04554	0.10065	297.03770	0	-15
0.1	0.00757	0.04471	0.36929	0.04578	0.10118	296.96250	0	-10
0.1	0.00772	0.06208	0.18061	0.04584	0.10131	296.91563	0	-5
0.1	0.00772	0.07966	0.01129	0.04581	0.10123	296.96836	0	0
0.1	0.00776	0.09270	-0.17010	0.04587	0.10137	297.05430	0	5
0.1	0.00768	0.10782	-0.35491	0.04584	0.10130	297.15781	0	10
0.1	0.00746	0.12971	-0.56944	0.04572	0.10103	297.24766	0	15
0.1	0.00734	0.31148	-0.57775	0.04590	0.10143	297.32871	-5	15
0.1	0.00758	0.27742	-0.34625	0.04569	0.10098	297.21250	-5	10
0.1	0.00768	0.26196	-0.15465	0.04600	0.10166	297.12461	-5	5
0.1	0.00773	0.24189	0.03099	0.04555	0.10067	297.16172	-5	0
0.1	0.00773	0.22518	0.19777	0.04553	0.10061	297.23203	-5	-5
0.1	0.00767	0.20791	0.38265	0.04563	0.10084	297.44102	-5	-10
0.1	0.00733	0.19529	0.61401	0.04569	0.10096	297.37363	-5	-15
0.1	0.00712	0.38603	0.65174	0.04555	0.10065	297.22520	-10	-15
0.1	0.00738	0.38866	0.40865	0.04590	0.10143	297.29453	-10	-10
0.1	0.00751	0.40789	0.21040	0.04608	0.10182	297.48301	-10	-5
0.1	0.00758	0.42149	0.03511	0.04557	0.10071	297.54746	-10	0
0.1	0.00763	0.44061	-0.14955	0.04599	0.10162	297.45957	-10	5
0.1	0.00740	0.47138	-0.34657	0.04530	0.10011	297.37461	-10	10
0.1	0.00712	0.52384	-0.56877	0.04538	0.10028	297.30723	-10	15
0.1	0.00682	0.74467	-0.56723	0.04563	0.10082	297.32480	-15	15
0.1	0.00703	0.69441	-0.34283	0.04602	0.10170	297.37949	-15	10
0.1	0.00730	0.64952	-0.13490	0.04600	0.10165	297.43418	-15	5
0.1	0.00730	0.62508	0.05563	0.04604	0.10175	297.47910	-15	0
0.1	0.00736	0.59878	0.24668	0.04595	0.10154	297.56602	-15	-5
0.1	0.00704	0.60095	0.44709	0.04594	0.10153	297.47715	-15	-10
0.1	0.00679	0.60396	0.69824	0.04588	0.10138	297.39512	-15	-15

Mach No.	Beta	Gamma	Delta	X	Actual Mach No.	Total Temp (K)	Pitch (Phi)	Yaw (Psi)
0.15	0.01542	0.59500	0.71170	0.06846	0.15148	298.51816	-15	-15
0.15	0.01594	0.60285	0.45971	0.06864	0.15189	298.79746	-15	-10
0.15	0.01647	0.59841	0.23867	0.06847	0.15151	298.79160	-15	-5
0.15	0.01644	0.62485	0.06015	0.06855	0.15167	298.80820	-15	0
0.15	0.01602	0.67228	-0.14057	0.06801	0.15047	298.72129	-15	5
0.15	0.01605	0.71588	-0.33194	0.06867	0.15195	298.65098	-15	10
0.15	0.01530	0.76255	-0.58103	0.06862	0.15183	298.61094	-15	15
0.15	0.01609	0.53820	-0.60061	0.06825	0.15101	298.54941	-10	15
0.15	0.01646	0.50075	-0.34887	0.06897	0.15262	298.46641	-10	10
0.15	0.01716	0.45682	-0.13694	0.06848	0.15152	298.49277	-10	5
0.15	0.01751	0.42100	0.03662	0.06868	0.15196	298.57480	-10	0
0.15	0.01683	0.41339	0.21833	0.06841	0.15137	298.73398	-10	-5
0.15	0.01627	0.40912	0.43346	0.06898	0.15265	298.77793	-10	-10
0.15	0.01625	0.39928	0.67963	0.06886	0.15238	298.74570	-10	-15
0.15	0.01662	0.21352	0.66185	0.06894	0.15255	298.67734	-5	-15
0.15	0.01705	0.22454	0.40537	0.06892	0.15251	298.55918	-5	-10
0.15	0.01734	0.23953	0.19953	0.06860	0.15179	298.48008	-5	-5
0.15	0.01737	0.25364	0.02730	0.06784	0.15010	298.39121	-5	0
0.15	0.01731	0.27327	-0.15812	0.06916	0.15305	298.45859	-5	5
0.15	0.01680	0.30176	-0.36129	0.06888	0.15243	298.58359	-5	10
0.15	0.01672	0.32721	-0.61044	0.06915	0.15301	298.66172	-5	15
0.15	0.01705	0.13842	-0.62281	0.06850	0.15156	298.76914	0	15
0.15	0.01743	0.11706	-0.37276	0.06817	0.15083	298.75254	0	10
0.15	0.01742	0.09732	-0.16096	0.06874	0.15211	298.69883	0	5
0.15	0.01761	0.08107	0.01134	0.06840	0.15134	298.64316	0	0
0.15	0.01714	0.06734	0.18547	0.06851	0.15159	298.57090	0	-5
0.15	0.01741	0.05421	0.37901	0.06924	0.15322	298.48594	0	-10
0.15	0.01678	0.03731	0.62438	0.06832	0.15117	298.40977	0	-15
0.15	0.01705	-0.13265	0.57920	0.06899	0.15266	298.45957	5	-15
0.15	0.01732	-0.12056	0.35923	0.06867	0.15194	298.55527	5	-10
0.15	0.01732	-0.10474	0.16359	0.06858	0.15176	298.75254	5	-5
0.15	0.01760	-0.07861	-0.00280	0.06881	0.15225	298.72910	5	0
0.15	0.01734	-0.07013	-0.17059	0.06852	0.15161	298.69199	5	5
0.15	0.01725	-0.05560	-0.38582	0.06944	0.15366	298.65488	5	10
0.15	0.01717	-0.03862	-0.59960	0.06843	0.15142	298.56797	5	15
0.15	0.01688	-0.23179	-0.61681	0.06814	0.15078	298.49961	10	15
0.15	0.01720	-0.24868	-0.39170	0.06860	0.15180	298.37754	10	10
0.15	0.01704	-0.26589	-0.17905	0.06913	0.15298	298.39414	10	5
0.15	0.01735	-0.27869	-0.01350	0.06838	0.15129	298.49961	10	0
0.15	0.01723	-0.29953	0.13644	0.06880	0.15223	298.57871	10	-5
0.15	0.01712	-0.31872	0.32925	0.06864	0.15188	298.69785	10	-10
0.15	0.01679	-0.32651	0.55442	0.06821	0.15093	298.78574	10	-15
0.15	0.01626	-0.55548	0.51644	0.06887	0.15239	298.77891	15	-15
0.15	0.01694	-0.54877	0.30650	0.06934	0.15343	298.74473	15	-10
0.15	0.01745	-0.51341	0.12893	0.06852	0.15162	298.71543	15	-5
0.15	0.01703	-0.49946	-0.01747	0.06882	0.15228	298.45957	15	0
0.15	0.01688	-0.50380	-0.18290	0.06908	0.15287	298.38926	15	5
0.15	0.01664	-0.48860	-0.37964	0.06796	0.15037	298.36777	15	10
0.15	0.01656	-0.44939	-0.60342	0.06844	0.15143	298.40781	15	15

Mach No.	Beta	Gamma	Delta	X	Actual Mach No.	Total Temp (K)	Pitch (Phi)	Yaw (Psi)
0.2	0.02818	-0.40284	-0.53053	0.09055	0.20073	298.72520	15	15
0.2	0.02955	-0.44730	-0.34629	0.09142	0.20265	298.95371	15	10
0.2	0.03157	-0.45900	-0.15525	0.09129	0.20238	298.98398	15	5
0.2	0.03125	-0.47196	0.00486	0.09077	0.20120	298.90195	15	0
0.2	0.03087	-0.49561	0.13585	0.09141	0.20264	298.80820	15	-5
0.2	0.03029	-0.51327	0.29147	0.09246	0.20499	298.80137	15	-10
0.2	0.02898	-0.49088	0.46802	0.09184	0.20360	298.72227	15	-15
0.2	0.02997	-0.32391	0.51427	0.09095	0.20161	298.59629	10	-15
0.2	0.03062	-0.31848	0.34198	0.09269	0.20549	298.59727	10	-10
0.2	0.03168	-0.31147	0.16277	0.09166	0.20320	298.72422	10	-5
0.2	0.03095	-0.30577	-0.00861	0.09194	0.20382	298.90684	10	0
0.2	0.03197	-0.27448	-0.16085	0.09181	0.20352	298.90391	10	5
0.2	0.03149	-0.25204	-0.37177	0.09100	0.20172	298.86875	10	10
0.2	0.03045	-0.22626	-0.54877	0.09211	0.20421	298.79063	10	15
0.2	0.03130	-0.07285	-0.54684	0.09155	0.20295	298.58652	5	15
0.2	0.03249	-0.05304	-0.37593	0.09259	0.20528	298.59531	5	10
0.2	0.03233	-0.08524	-0.16476	0.09228	0.20458	298.80527	5	5
0.2	0.03128	-0.06781	-0.00138	0.09203	0.20403	298.94980	5	0
0.2	0.03195	-0.07828	0.16851	0.09225	0.20452	298.89902	5	-5
0.2	0.03176	-0.14413	0.38551	0.09099	0.20170	298.91465	5	-10
0.2	0.03103	-0.16319	0.55095	0.09124	0.20226	298.81699	5	-15
0.2	0.03101	-0.00205	0.58514	0.09165	0.20318	298.66563	0	-15
0.2	0.03176	0.02430	0.39583	0.09218	0.20436	298.63145	0	-10
0.2	0.03204	0.02254	0.19332	0.09110	0.20195	298.64023	0	-5
0.2	0.03088	0.06218	0.01340	0.09181	0.20352	298.75645	0	0
0.2	0.03079	0.09198	-0.15209	0.09102	0.20178	298.98203	0	5
0.2	0.03122	0.08894	-0.38688	0.09202	0.20401	298.97617	0	10
0.2	0.03033	0.07679	-0.57836	0.09214	0.20427	298.89707	0	15
0.2	0.03071	0.23979	-0.54835	0.09161	0.20308	298.84922	-5	15
0.2	0.03235	0.22533	-0.34620	0.09177	0.20345	298.74180	-5	10
0.2	0.03244	0.21723	-0.13260	0.09086	0.20140	298.63535	-5	5
0.2	0.03175	0.21862	0.01564	0.09256	0.20521	298.53965	-5	0
0.2	0.03120	0.19090	0.20437	0.09192	0.20379	298.67832	-5	-5
0.2	0.03038	0.16581	0.44889	0.09134	0.20248	298.86094	-5	-10
0.2	0.02981	0.13987	0.64682	0.09160	0.20306	299.03477	-5	-15
0.2	0.02998	0.29652	0.61785	0.09228	0.20459	298.94980	-10	-15
0.2	0.03099	0.33196	0.40445	0.09103	0.20179	298.86582	-10	-10
0.2	0.03161	0.36171	0.21614	0.09211	0.20420	298.84531	-10	-5
0.2	0.03154	0.38418	0.05457	0.09137	0.20255	298.77988	-10	0
0.2	0.03174	0.38745	-0.13224	0.09200	0.20395	298.68223	-10	5
0.2	0.03080	0.37943	-0.32359	0.09085	0.20139	298.59531	-10	10
0.2	0.02945	0.41152	-0.51773	0.09039	0.20035	298.77109	-10	15
0.2	0.02770	0.59232	-0.47300	0.09198	0.20390	298.93809	-15	15
0.2	0.02854	0.62655	-0.29542	0.09165	0.20317	298.98008	-15	10
0.2	0.02966	0.60111	-0.10922	0.09171	0.20331	298.96250	-15	5
0.2	0.03043	0.55761	0.06791	0.09212	0.20424	298.91660	-15	0
0.2	0.02951	0.54089	0.24083	0.09215	0.20430	298.83066	-15	-5
0.2	0.02741	0.54769	0.43193	0.09140	0.20261	298.72422	-15	-10
0.2	0.02686	0.49199	0.65152	0.09141	0.20264	298.65781	-15	-15

Mach No.	Beta	Gamma	Delta	X	Actual Mach No.	Total Temp (K)	Pitch (Phi)	Yaw (Psi)
0.25	0.04243	-0.55337	0.49343	0.11302	0.25109	297.42246	15	-15
0.25	0.04423	-0.55297	0.30185	0.11224	0.24934	297.74180	15	-10
0.25	0.04511	-0.53330	0.13143	0.11286	0.25073	297.71348	15	-5
0.25	0.04525	-0.52133	-0.01106	0.11234	0.24958	297.76914	15	0
0.25	0.04569	-0.50097	-0.18509	0.11249	0.24990	297.98105	15	5
0.25	0.04420	-0.47349	-0.37408	0.11312	0.25133	298.23105	15	10
0.25	0.04198	-0.43472	-0.57079	0.11232	0.24952	298.45957	15	15
0.25	0.04354	-0.24781	-0.60282	0.11294	0.25092	298.37852	10	15
0.25	0.04560	-0.26149	-0.41165	0.11245	0.24983	298.25449	10	10
0.25	0.04576	-0.30261	-0.19841	0.11269	0.25035	298.23301	10	5
0.25	0.04641	-0.32949	-0.01128	0.11281	0.25062	298.40000	10	0
0.25	0.04574	-0.35006	0.15399	0.11224	0.24934	298.58359	10	-5
0.25	0.04482	-0.35482	0.35357	0.11197	0.24873	298.78965	10	-10
0.25	0.04325	-0.34646	0.55564	0.11265	0.25027	298.82383	10	-15
0.25	0.04409	-0.16002	0.58844	0.11256	0.25008	298.67832	5	-15
0.25	0.04598	-0.14516	0.40061	0.11190	0.24858	298.50645	5	-10
0.25	0.04614	-0.13102	0.17667	0.11410	0.25352	298.55625	5	-5
0.25	0.04625	-0.10864	-0.00008	0.11313	0.25136	298.75156	5	0
0.25	0.04666	-0.08803	-0.20903	0.11260	0.25016	298.94688	5	5
0.25	0.04680	-0.07630	-0.41716	0.11353	0.25226	298.88926	5	10
0.25	0.04435	-0.08121	-0.61224	0.11308	0.25125	298.75840	5	15
0.25	0.04485	0.08950	-0.61344	0.11336	0.25187	298.59238	0	15
0.25	0.04679	0.09533	-0.41808	0.11355	0.25229	298.67051	0	10
0.25	0.04641	0.08462	-0.18825	0.11349	0.25217	298.74277	0	5
0.25	0.04595	0.06684	0.01091	0.11320	0.25151	298.87070	0	0
0.25	0.04590	0.05039	0.20185	0.11333	0.25181	298.90879	0	-5
0.25	0.04629	0.02927	0.43355	0.11250	0.24993	298.82188	0	-10
0.25	0.04508	0.00445	0.61678	0.11295	0.25095	298.64023	0	-15
0.25	0.04398	0.16245	0.64995	0.11270	0.25039	298.44688	-5	-15
0.25	0.04577	0.19350	0.43776	0.11300	0.25106	298.83652	-5	-10
0.25	0.04553	0.22068	0.21131	0.11311	0.25130	298.65098	-5	-5
0.25	0.04554	0.23921	0.02773	0.11328	0.25169	298.52891	-5	0
0.25	0.04567	0.25359	-0.16228	0.11285	0.25072	298.65781	-5	5
0.25	0.04529	0.26589	-0.39373	0.11300	0.25107	298.82090	-5	10
0.25	0.04358	0.25928	-0.60678	0.11276	0.25051	298.95859	-5	15
0.25	0.04192	0.45399	-0.57220	0.11232	0.24953	298.81113	-10	15
0.25	0.04368	0.45267	-0.34341	0.11244	0.24979	298.61484	-10	10
0.25	0.04465	0.44043	-0.14834	0.11334	0.25183	298.63926	-10	5
0.25	0.04503	0.41796	0.04251	0.11241	0.24973	298.69883	-10	0
0.25	0.04436	0.39741	0.22627	0.11284	0.25071	298.95957	-10	-5
0.25	0.04403	0.36398	0.43956	0.11307	0.25121	299.01426	-10	-10
0.25	0.04200	0.33695	0.66243	0.11244	0.24980	298.94785	-10	-15
0.25	0.03916	0.53412	0.66733	0.11244	0.24980	298.75547	-15	-15
0.25	0.04149	0.56450	0.43795	0.11311	0.25130	298.73594	-15	-10
0.25	0.04286	0.59335	0.23545	0.11254	0.25002	298.88926	-15	-5
0.25	0.04331	0.61553	0.05392	0.11249	0.24992	299.08652	-15	0
0.25	0.04292	0.63901	-0.12852	0.11246	0.24984	299.03184	-15	5
0.25	0.04111	0.65922	-0.32109	0.11213	0.24911	298.94297	-15	10
0.25	0.03881	0.68237	-0.53051	0.11219	0.24923	298.84434	-15	15

Mach No.	Beta	Gamma	Delta	X	Actual Mach No.	Total Temp (K)	Pitch (Phi)	Yaw (Psi)
0.3	0.05455	0.64918	-0.47740	0.13578	0.30253	298.79355	-15	15
0.3	0.05896	0.62148	-0.27704	0.13641	0.30396	299.02793	-15	10
0.3	0.06133	0.60734	-0.10987	0.13562	0.30218	298.89512	-15	5
0.3	0.06215	0.58445	0.05111	0.13617	0.30342	298.75840	-15	0
0.3	0.06128	0.55976	0.21640	0.13518	0.30118	298.66074	-15	-5
0.3	0.05903	0.52359	0.39301	0.13535	0.30157	298.60117	-15	-10
0.3	0.05546	0.48864	0.60649	0.13534	0.30155	298.96348	-15	-15
0.3	0.05970	0.31409	0.60941	0.13513	0.30107	298.82969	-10	-15
0.3	0.06188	0.36227	0.40635	0.13556	0.30203	298.69590	-10	-10
0.3	0.06352	0.39112	0.21487	0.13566	0.30226	298.56895	-10	-5
0.3	0.06417	0.41212	0.04272	0.13579	0.30256	298.78770	-10	0
0.3	0.06344	0.42877	-0.13762	0.13554	0.30198	298.96738	-10	5
0.3	0.06133	0.43431	-0.31981	0.13491	0.30057	298.88535	-10	10
0.3	0.05882	0.42885	-0.52551	0.13561	0.30215	298.78477	-10	15
0.3	0.06079	0.24397	-0.56173	0.13405	0.29861	298.58945	-5	15
0.3	0.06282	0.24926	-0.37237	0.13434	0.29927	298.54160	-5	10
0.3	0.06393	0.24462	-0.16059	0.13421	0.29896	298.68320	-5	5
0.3	0.06418	0.23514	0.02501	0.13392	0.29831	298.81211	-5	0
0.3	0.06377	0.21787	0.21377	0.13393	0.29833	299.01523	-5	-5
0.3	0.06354	0.19141	0.42588	0.13424	0.29905	298.98301	-5	-10
0.3	0.06169	0.15399	0.60339	0.13469	0.30007	298.95078	-5	-15
0.3	0.06250	0.00990	0.58492	0.13407	0.29866	298.93223	0	-15
0.3	0.06469	0.03342	0.41749	0.13435	0.29929	298.81699	0	-10
0.3	0.06408	0.05448	0.20839	0.13466	0.30000	298.79648	0	-5
0.3	0.06319	0.06649	0.01335	0.13424	0.29905	298.75547	0	0
0.3	0.06407	0.07621	-0.20192	0.13416	0.29886	299.20078	0	5
0.3	0.06415	0.07760	-0.40525	0.13422	0.29901	299.25645	0	10
0.3	0.06167	0.08083	-0.57979	0.13442	0.29944	299.17148	0	15
0.3	0.06137	-0.07996	-0.57725	0.13408	0.29868	299.11582	5	15
0.3	0.06388	-0.09264	-0.40525	0.13367	0.29775	299.08750	5	10
0.3	0.06442	-0.09844	-0.21846	0.13363	0.29766	298.94688	5	5
0.3	0.06399	-0.11708	-0.00038	0.13433	0.29925	298.89219	5	0
0.3	0.06437	-0.12805	0.18083	0.13374	0.29791	299.06504	5	-5
0.3	0.06359	-0.14042	0.40030	0.13369	0.29780	299.39023	5	-10
0.3	0.06130	-0.14966	0.56095	0.13420	0.29895	299.41172	5	-15
0.3	0.05987	-0.32547	0.52627	0.13384	0.29813	299.40977	10	-15
0.3	0.06339	-0.34481	0.34108	0.13487	0.30048	299.33652	10	-10
0.3	0.06563	-0.34477	0.15258	0.13488	0.30049	299.27695	10	-5
0.3	0.06505	-0.34097	-0.00707	0.13532	0.30148	299.23203	10	0
0.3	0.06556	-0.31294	-0.19239	0.13541	0.30169	299.17930	10	5
0.3	0.06415	-0.27424	-0.39087	0.13529	0.30143	299.12070	10	10
0.3	0.06107	-0.24974	-0.56192	0.13548	0.30185	299.06504	10	15
0.3	0.05798	-0.43638	-0.53414	0.13513	0.30107	299.03770	15	15
0.3	0.06173	-0.48086	-0.34684	0.13513	0.30106	299.16074	15	10
0.3	0.06417	-0.50341	-0.16567	0.13515	0.30112	299.38535	15	5
0.3	0.06425	-0.50624	-0.01480	0.13544	0.30176	299.51133	15	0
0.3	0.06302	-0.52257	0.13149	0.13444	0.29949	299.45762	15	-5
0.3	0.06146	-0.53826	0.28053	0.13520	0.30123	299.47227	15	-10
0.3	0.05821	-0.53911	0.46783	0.13562	0.30217	299.38340	15	-15

Mach No.	Beta	Gamma	Delta	X	Actual Mach No.	Total Temp (K)	Pitch (Phi)	Yaw (Psi)
0.35	0.07756	-0.34203	-0.47342	0.15624	0.34920	297.35898	15	15
0.35	0.08207	-0.40124	-0.31352	0.15602	0.34869	297.68906	15	10
0.35	0.08452	-0.44147	-0.14117	0.15673	0.35031	297.87754	15	5
0.35	0.08488	-0.45877	-0.00755	0.15654	0.34987	297.92441	15	0
0.35	0.08471	-0.46056	0.10584	0.15630	0.34934	297.90879	15	-5
0.35	0.08149	-0.46612	0.23746	0.15688	0.35066	297.93516	15	-10
0.35	0.07893	-0.43990	0.40616	0.15669	0.35023	298.06699	15	-15
0.35	0.08254	-0.22752	0.47450	0.15677	0.35041	298.36875	10	-15
0.35	0.08650	-0.27289	0.31583	0.15645	0.34968	298.61875	10	-10
0.35	0.08798	-0.29176	0.14189	0.15688	0.35066	298.77695	10	-5
0.35	0.08836	-0.28265	-0.00826	0.15701	0.35095	298.77988	10	0
0.35	0.08777	-0.25310	-0.18235	0.15722	0.35143	298.81504	10	5
0.35	0.08665	-0.19103	-0.35641	0.15723	0.35147	298.81699	10	10
0.35	0.08264	-0.14935	-0.51266	0.15731	0.35164	298.81504	10	15
0.35	0.08431	-0.01277	-0.52747	0.15700	0.35093	298.65098	5	15
0.35	0.08781	-0.03341	-0.36309	0.15755	0.35220	298.65391	5	10
0.35	0.08888	-0.06256	-0.21348	0.15736	0.35175	298.55723	5	5
0.35	0.08842	-0.09264	-0.00230	0.15657	0.34995	298.48691	5	0
0.35	0.08885	-0.10100	0.19028	0.15653	0.34986	298.74961	5	-5
0.35	0.08811	-0.09014	0.36517	0.15694	0.35080	298.91563	5	-10
0.35	0.08533	-0.08138	0.50925	0.15770	0.35254	299.12559	5	-15
0.35	0.08474	0.04984	0.54473	0.15826	0.35381	299.13242	0	-15
0.35	0.08801	0.07432	0.39097	0.15751	0.35210	299.07676	0	-10
0.35	0.08915	0.09291	0.21755	0.15786	0.35291	298.96250	0	-5
0.35	0.08818	0.10737	0.00994	0.15784	0.35286	298.94297	0	0
0.35	0.08958	0.12435	-0.20278	0.15793	0.35306	299.16270	0	5
0.35	0.08811	0.13331	-0.36809	0.15825	0.35380	299.07871	0	10
0.35	0.08482	0.12786	-0.52385	0.15747	0.35200	299.05527	0	15
0.35	0.08246	0.26750	-0.51157	0.15761	0.35232	298.92539	-5	15
0.35	0.08584	0.27573	-0.34992	0.15776	0.35267	298.85020	-5	10
0.35	0.08747	0.27024	-0.15167	0.15757	0.35224	298.70176	-5	5
0.35	0.08755	0.25428	0.02747	0.15778	0.35273	298.69297	-5	0
0.35	0.08743	0.23508	0.20460	0.15813	0.35351	298.88730	-5	-5
0.35	0.08589	0.20471	0.40258	0.15800	0.35323	299.11387	-5	-10
0.35	0.08301	0.16082	0.56775	0.15776	0.35267	299.16270	-5	-15
0.35	0.07834	0.29962	0.58046	0.15774	0.35263	299.19102	-10	-15
0.35	0.08274	0.34524	0.37726	0.15762	0.35235	299.09531	-10	-10
0.35	0.08481	0.38163	0.20486	0.15808	0.35341	299.03086	-10	-5
0.35	0.08443	0.40929	0.04258	0.15652	0.34984	298.63242	-10	0
0.35	0.08407	0.43310	-0.11932	0.15685	0.35058	298.96152	-10	5
0.35	0.08140	0.44215	-0.28798	0.15707	0.35109	299.07773	-10	10
0.35	0.07749	0.43662	-0.48925	0.15712	0.35122	299.18223	-10	15
0.35	0.07172	0.64391	-0.43574	0.15680	0.35048	299.07676	-15	15
0.35	0.07727	0.62555	-0.24434	0.15676	0.35038	299.06699	-15	10
0.35	0.08049	0.59719	-0.09125	0.15650	0.34979	298.97617	-15	5
0.35	0.08143	0.57698	0.04537	0.15660	0.35001	298.91660	-15	0
0.35	0.07924	0.55517	0.19537	0.15690	0.35071	298.76816	-15	-5
0.35	0.07623	0.52058	0.36460	0.15662	0.35006	298.70957	-15	-10
0.35	0.07142	0.47482	0.58195	0.15672	0.35030	298.67930	-15	-15

APPENDIX B: SCANIVALVE PORT ASSIGNMENTS

'tranverse_probe' Scanivalve Channel Assignments

1	Atmospheric Pressure	**17**	Not Used	**33**	Not Used
2	Calibration Pressure	**18**	Not Used	**34**	Not Used
3	Plenum Pressure	**19**	Not Used	**35**	Not Used
4	Not Used	**20**	Not Used	**36**	Not Used
5	Port 1 Pressure	**21**	Not Used	**37**	Not Used
6	Port 2 Pressure	**22**	Not Used	**38**	Not Used
7	Port 3 Pressure	**23**	Not Used	**39**	Not Used
8	Port 4 Pressure	**24**	Not Used	**40**	Not Used
9	Port 5 Pressure	**25**	Not Used	**41**	Not Used
10	Total Prandtl Pressure	**26**	Not Used	**42**	Not Used
11	Static Prandtl Pressure	**27**	Not Used	**43**	Not Used
12	Not Used	**28**	Not Used	**44**	Not Used
13	Not Used	**29**	Not Used	**45**	Not Used
14	Not Used	**30**	Not Used	**46**	Not Used
15	Not Used	**31**	Not Used	**47**	Not Used
16	Not Used	**32**	Not Used	**48**	Not Used

Calibration Scanivalve Channel Assignments

1	Atmospheric Pressure	**17**	Not Used	**33**	Not Used
2	Calibration Pressure	**18**	Not Used	**34**	Not Used
3	Port 1 Pressure	**19**	Not Used	**35**	Not Used
4	Port 2 Pressure	**20**	Not Used	**36**	Not Used
5	Port 3 Pressure	**21**	Not Used	**37**	Not Used
6	Port 4 Pressure	**22**	Not Used	**38**	Not Used
7	Port 5 Pressure	**23**	Not Used	**39**	Not Used
8	Jet Total Press / Temp Combination	**24**	Not Used	**40**	Not Used
9	Not Used	**25**	Not Used	**41**	Not Used
10	Jet Total Pressure	**26**	Not Used	**42**	Not Used
11	Jet Static Pressure	**27**	Not Used	**43**	Not Used
12	Not Used	**28**	Not Used	**44**	Not Used
13	Pipe Total Press / Temp Combination	**29**	Not Used	**45**	Not Used
14	Not Used	**30**	Not Used	**46**	Not Used
15	Not Used	**31**	Not Used	**47**	Not Used
16	Not Used	**32**	Not Used	**48**	Not Used

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APPENDIX C: OPERATING THE 'TRANSVERSE_PROBE' PROGRAM

A. PROGRAM OPERATION

1. Turn on the NF90 Motor Controller.

2. Initialize the NF90: use 'initialize' box in 'transverse_reset' user function.

3. Position probe for first survey run: use 'Initial Position' selection in 'transverse_reset'. The zero position on the traverse mechanism has been set to align with blade 3 because of better visual alignment. However, surveys were run from blade 4 to blade 3, therefore initial position is critical. Also note that the program moves the probe assembly before taking data, correct initial position is one position increment before the first survey point.

4. Calibrate the transducer and enter calibration value into program's front panel shown in Figure 6. (10 in H2O = 0.7355 in HG)

5. In 'Run_no.txt', reset value to 1.

6. Enter values for atmospheric pressure, pitch and yaw angles into the front panel.

7. The distance traveled between pressure measurements can be changed by going to 'main' and changing the value in the 'Transverse Distance' box. (1 inch advancement = 16000 steps [Ref 10]).

8. The number of survey points recorded can be changed on the front panel in the 'No. Runs' box.

9. To change time delay before pressure data recorded change the value in the 'Time Delay' box on the front panel.

10. Start survey by using 'Start' button on the front panel.

11. Survey data is saved in 'Output.txt'.

12. To reset probe for next survey run, use 'Between Runs Reset' in the 'traverse_reset' user function.

13. If probe location is in doubt, use 'transverse_position' on front panel; this will give location with respect to zero setting in number steps. Turning off NF90 will reset zero value to mechanism's current location. Therefore, always reset mechanism to zero position before turning off NF90.

B. PROGRAM LAYOUT

A simplified program flow diagram for 'transverse_probe' is shown in Figure 22. For a more detailed look at the program's layout, actual screen shots from the program follow at the end of this section.

The main user interface for 'transverse_probe' is the front panel shown in Figure 6. All necessary parameter changes are input here, in addition to viewing the current survey point pressure and Mach number outputs. The program starts at the main user function level. When the program is run the first input is the desired numbers of runs in the survey. Its next step is to send a signal to the UNISLIDE traverse mechanism to advance the probe the desired distance. Then there is a time delay before pressure readings are taken. After the time delay the program calls the user function 'run_probe' which will accomplish all the pressure data collection and calculations.

The first step of 'run_probe' is to call the 'constants' user function to collect the necessary constant values that will be used in successive user functions as well as set the time delay in the Scanivalve and user input pitch and yaw angles.
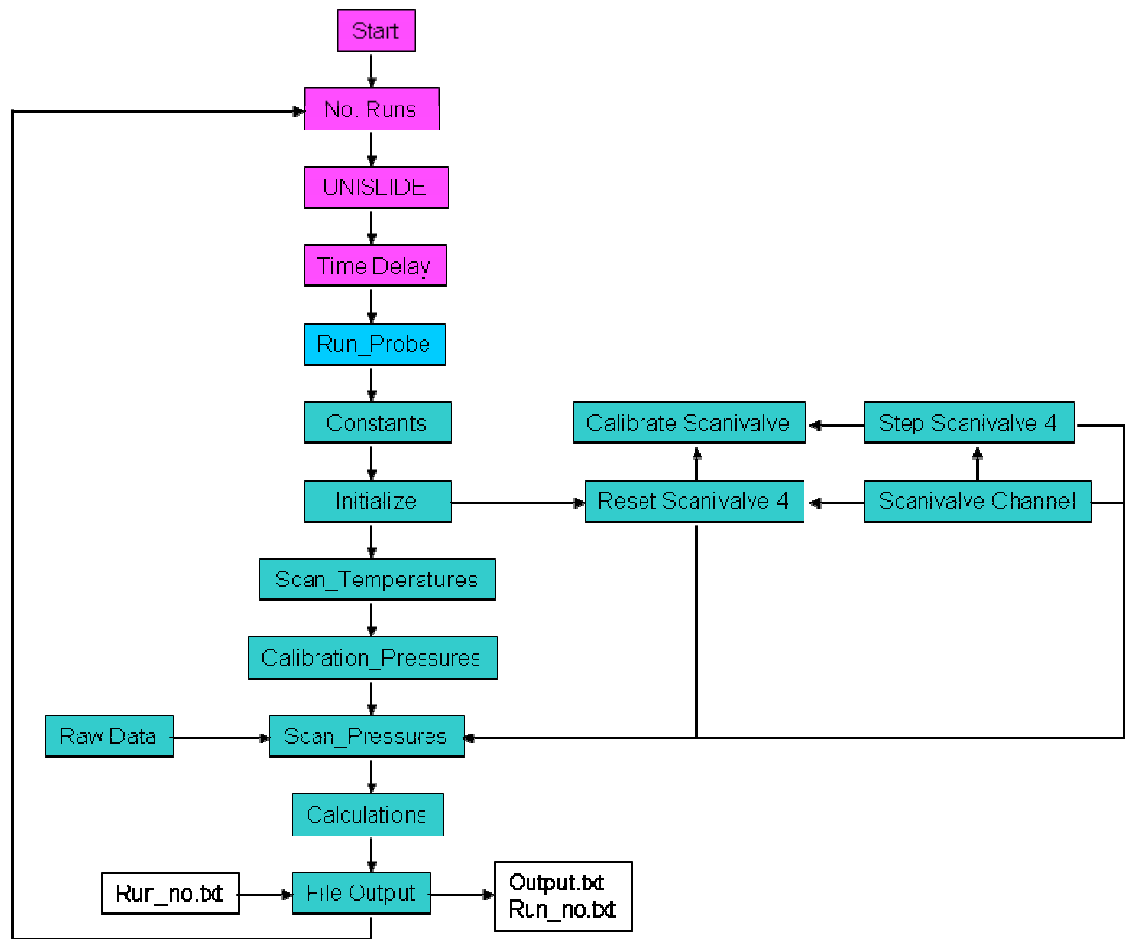
Figure 22.   'transverse probe' Program Flow Diagram

Next it will call the user function 'initialize' which brings the Scanivalve into the program, resets it, and makes sure it's calibration information is set. From there the program scans for temperatures, ensures the instrumentation has necessary pressure calibration parameters and then collects the pressure readings. Then all the data is fed into the 'calculations' function which calculates the Mach number, the Mach number sensitivity (β), pitch sensitivity (γ) and yaw sensitivity (δ). The final steps in the program are to output the data to the output file, update the run number, and start the process over again until the desired number of runs is complete.

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Main Program Function
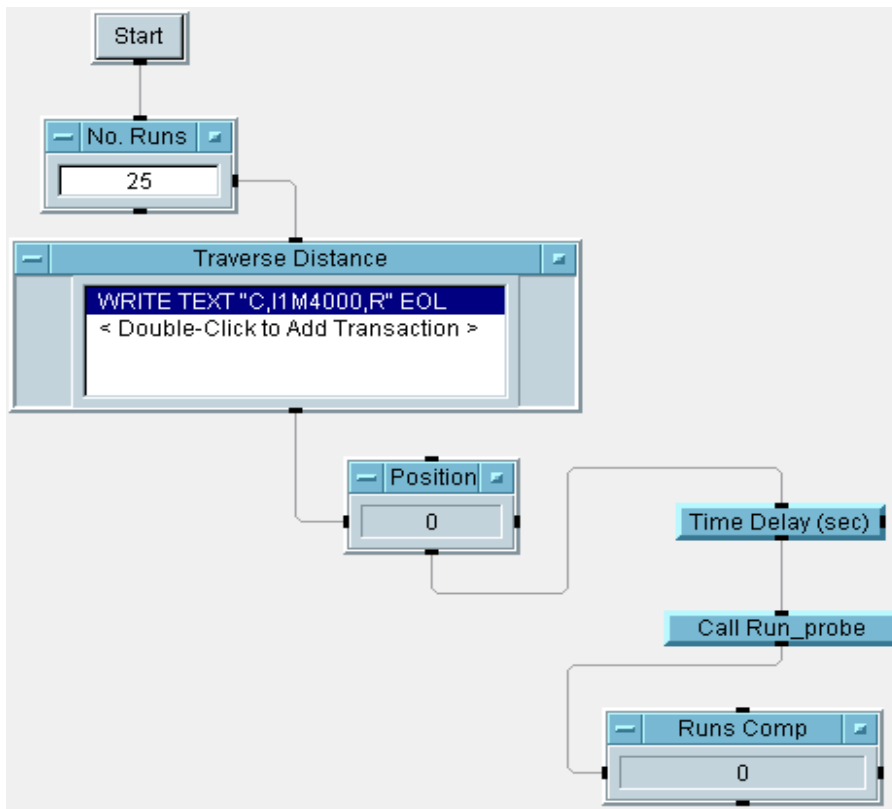
Run_Probe User Function

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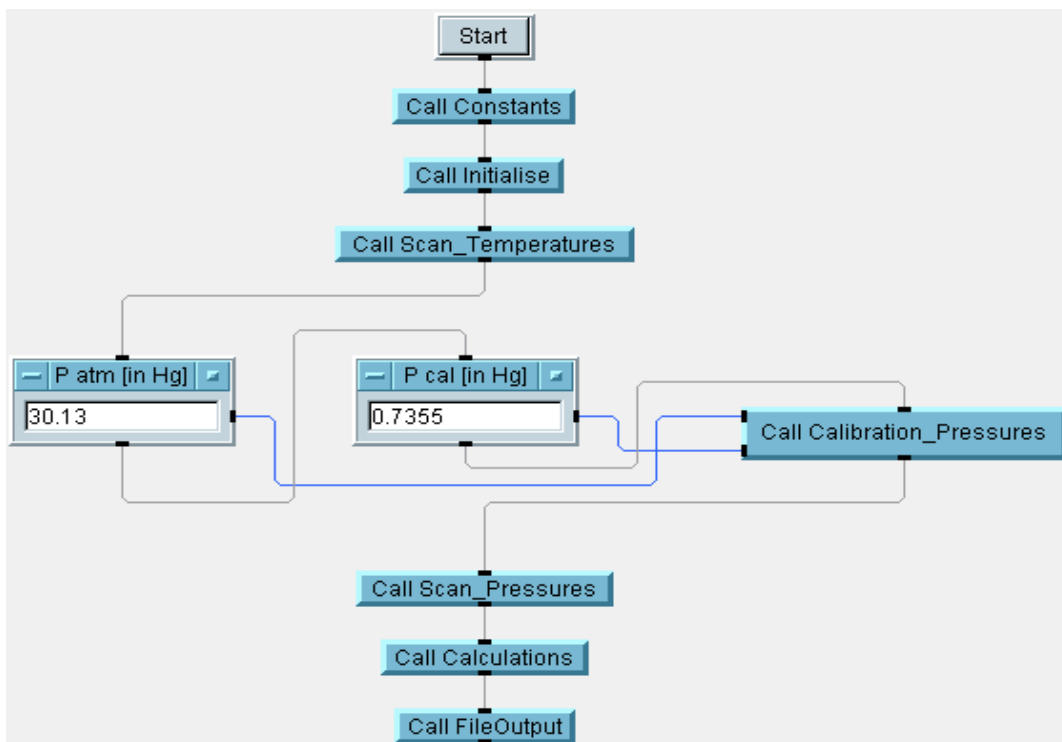
Constants User Function
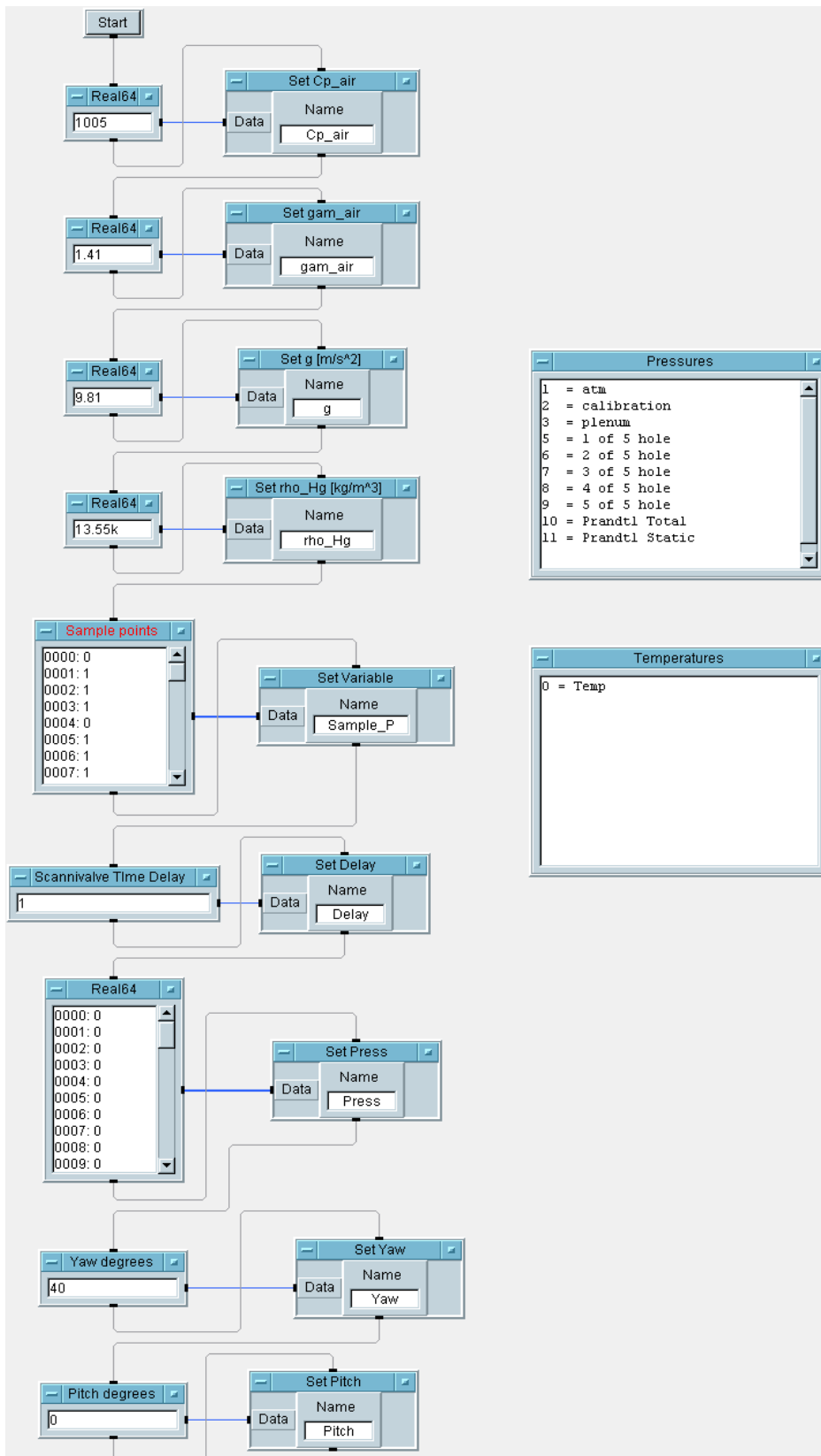
Initialize User Function
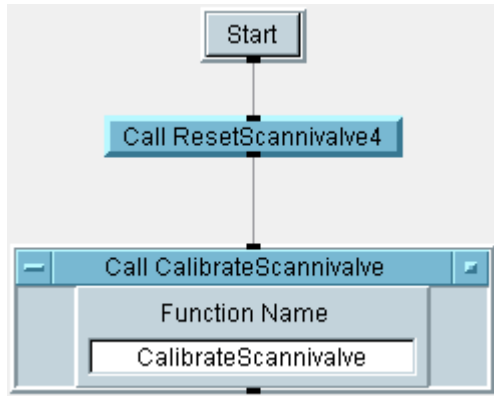
Reset Scanivalve4 User Function
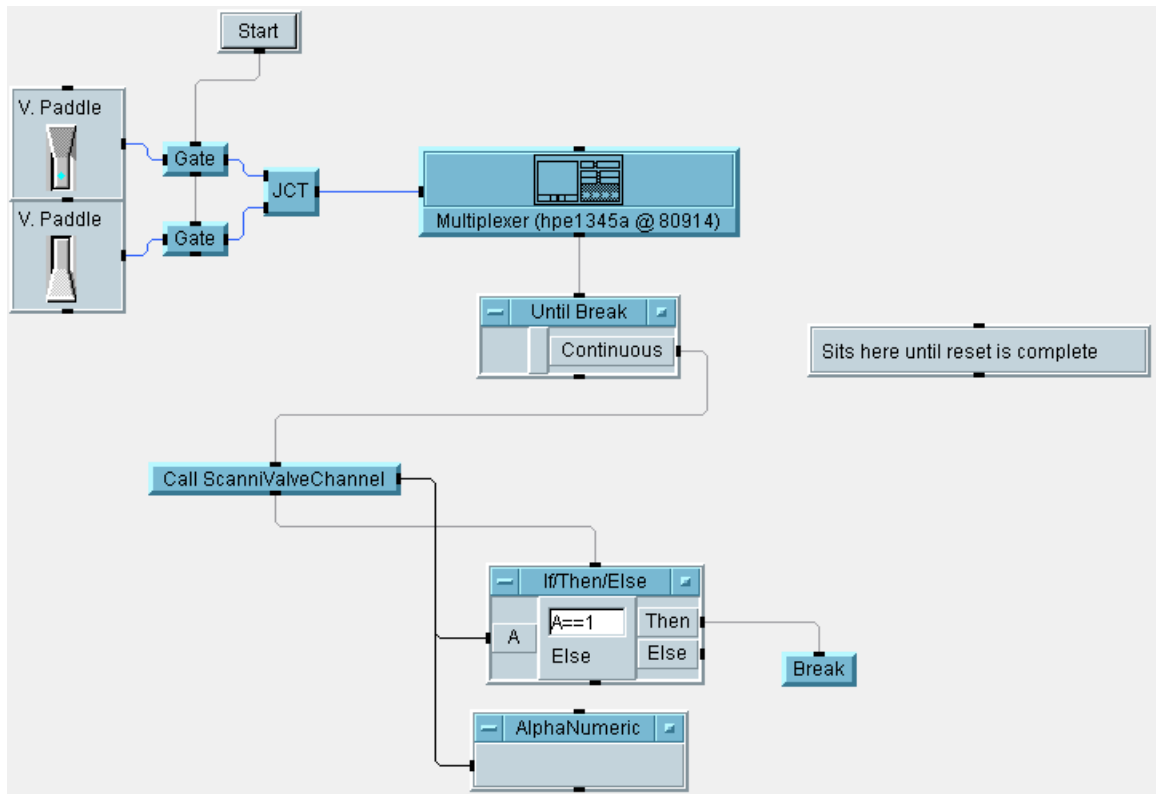
Calibrate Scanivalve User Function
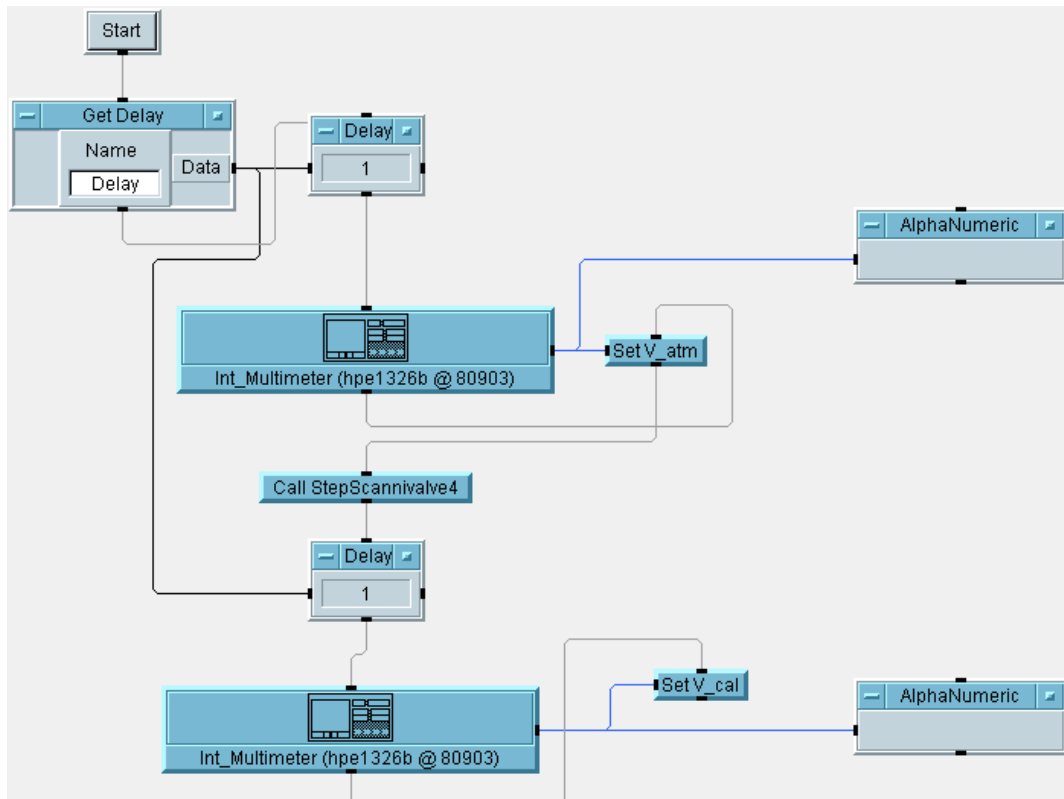
Step Scannivalve4 User Function
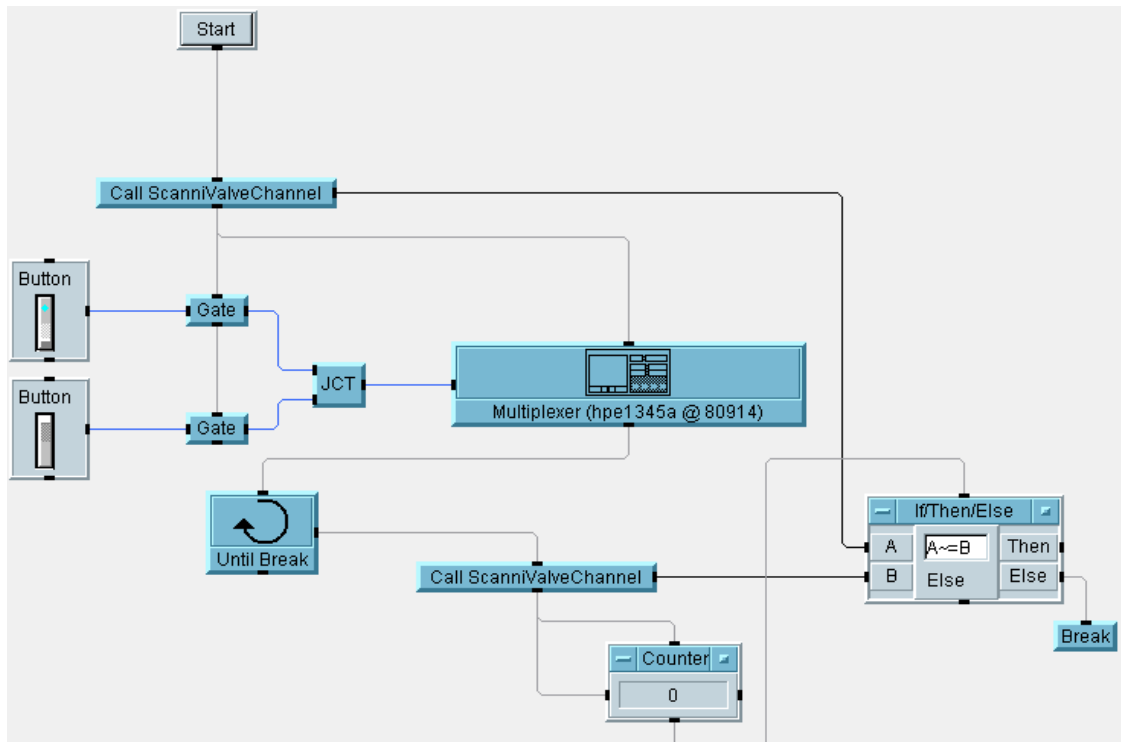
Scanivalve Channel User Function
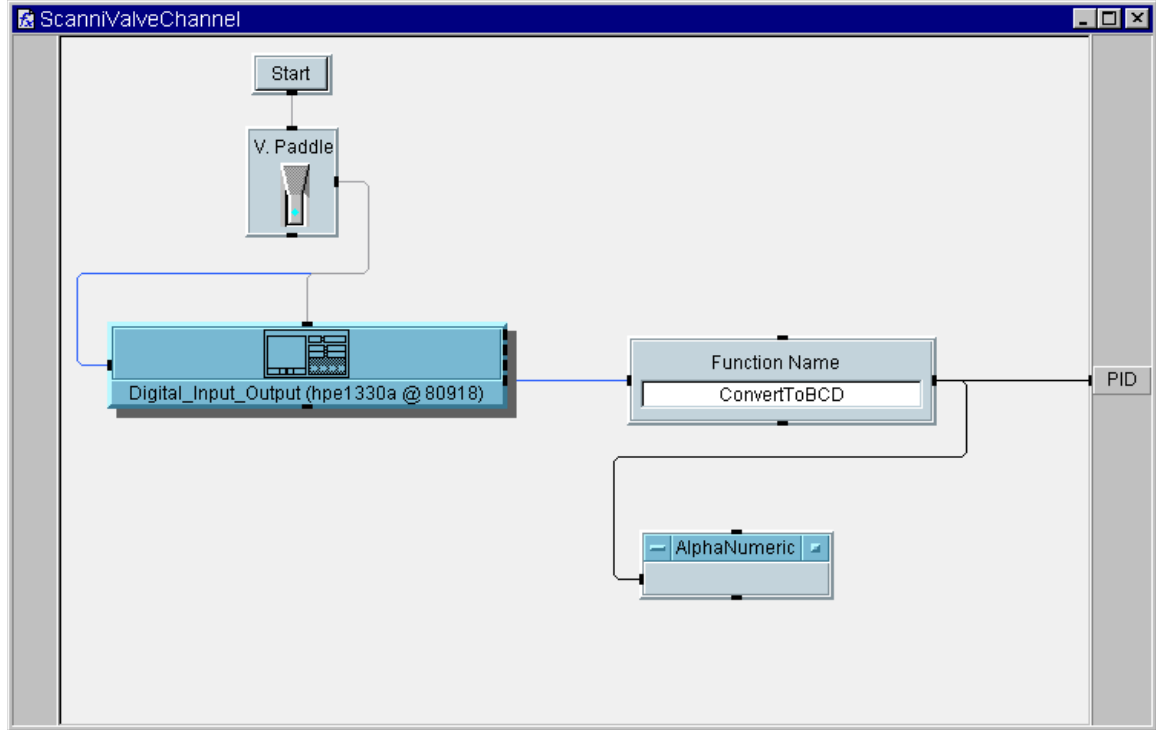
Scan Temperatures User Function
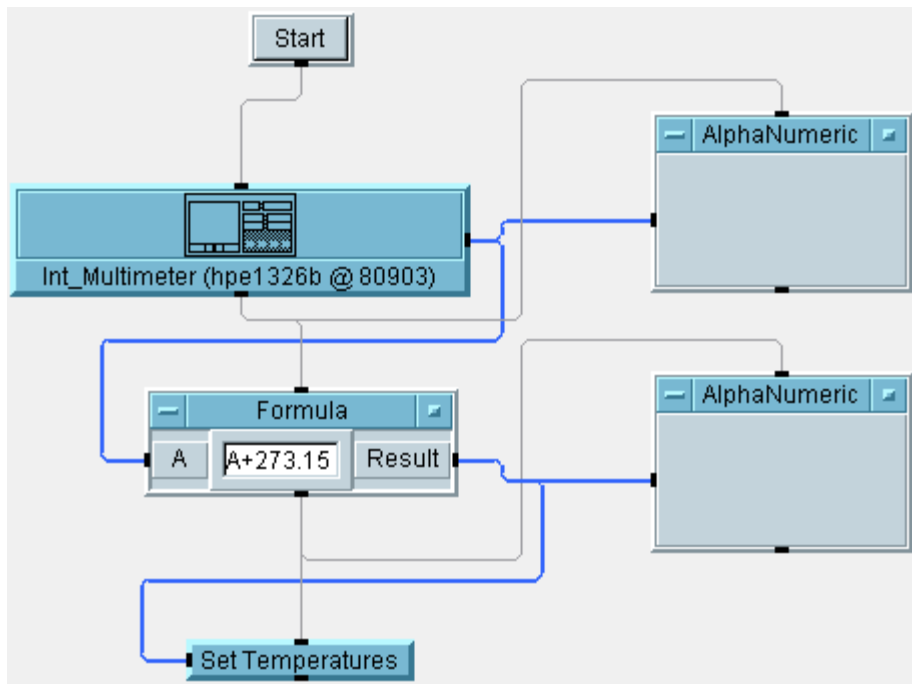
Calibration Pressures User Function
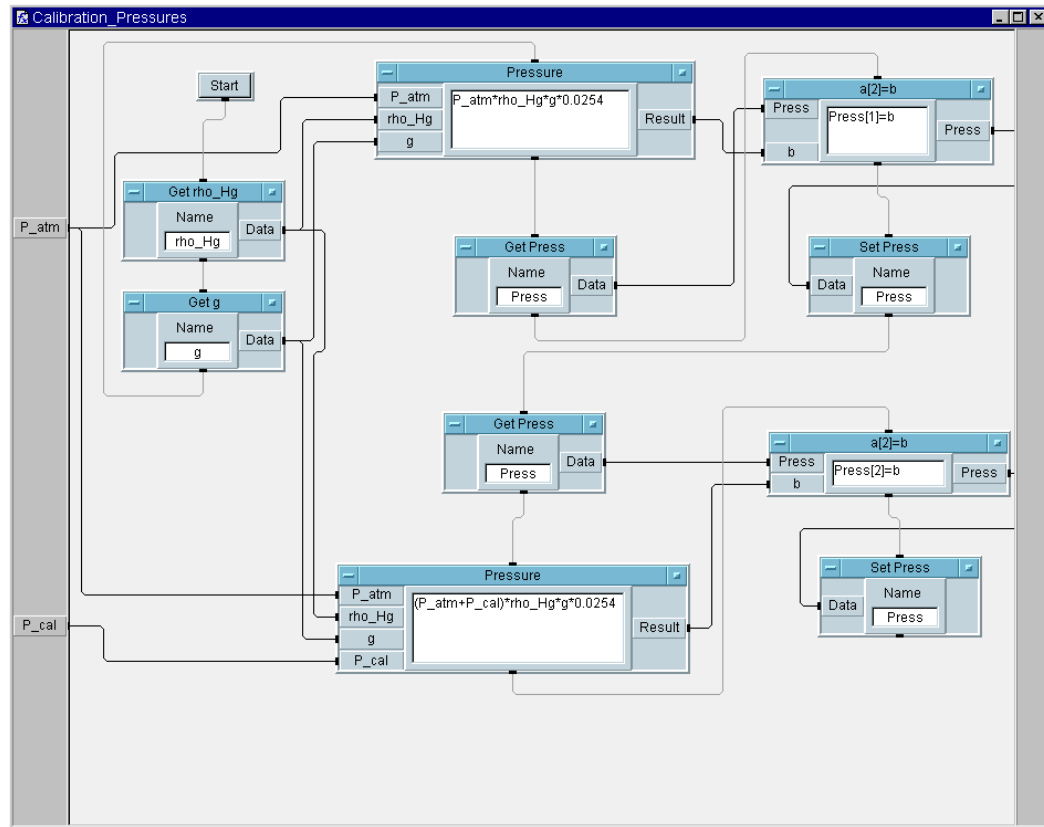
Raw Data User Function
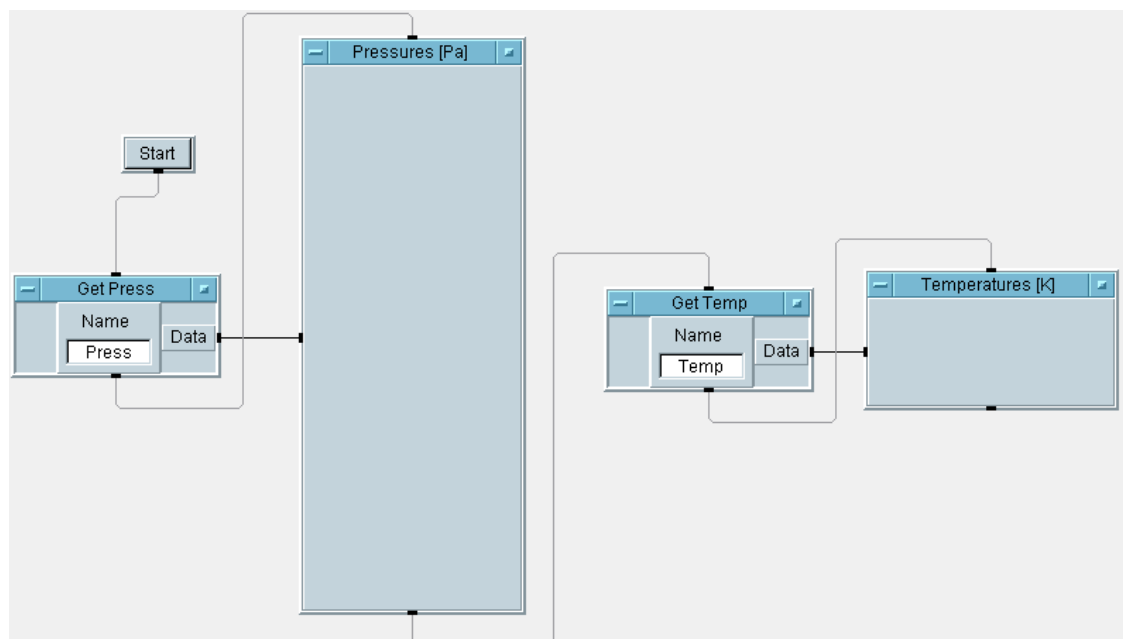
Scan Pressure User Function
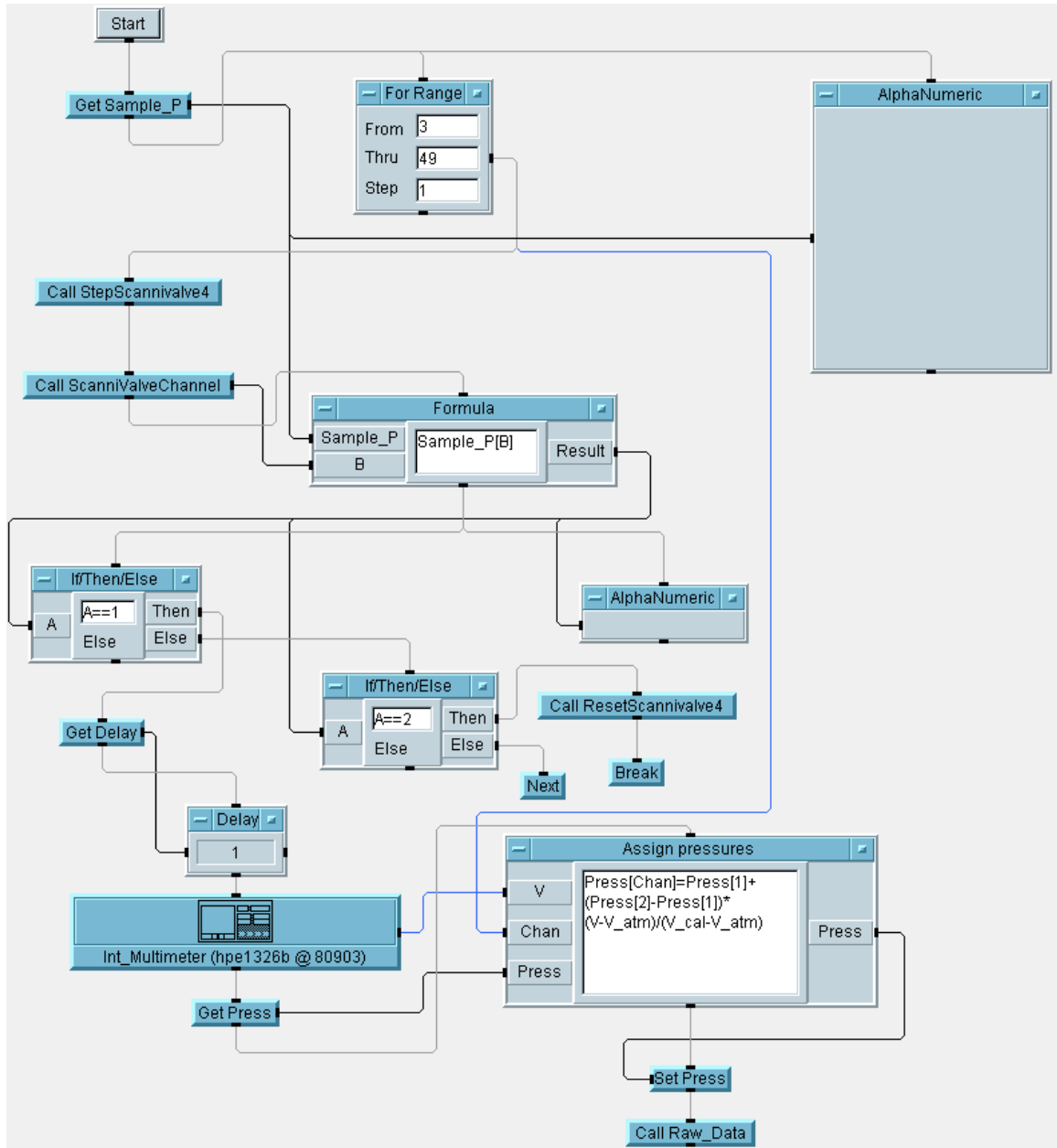
Calculations User Function
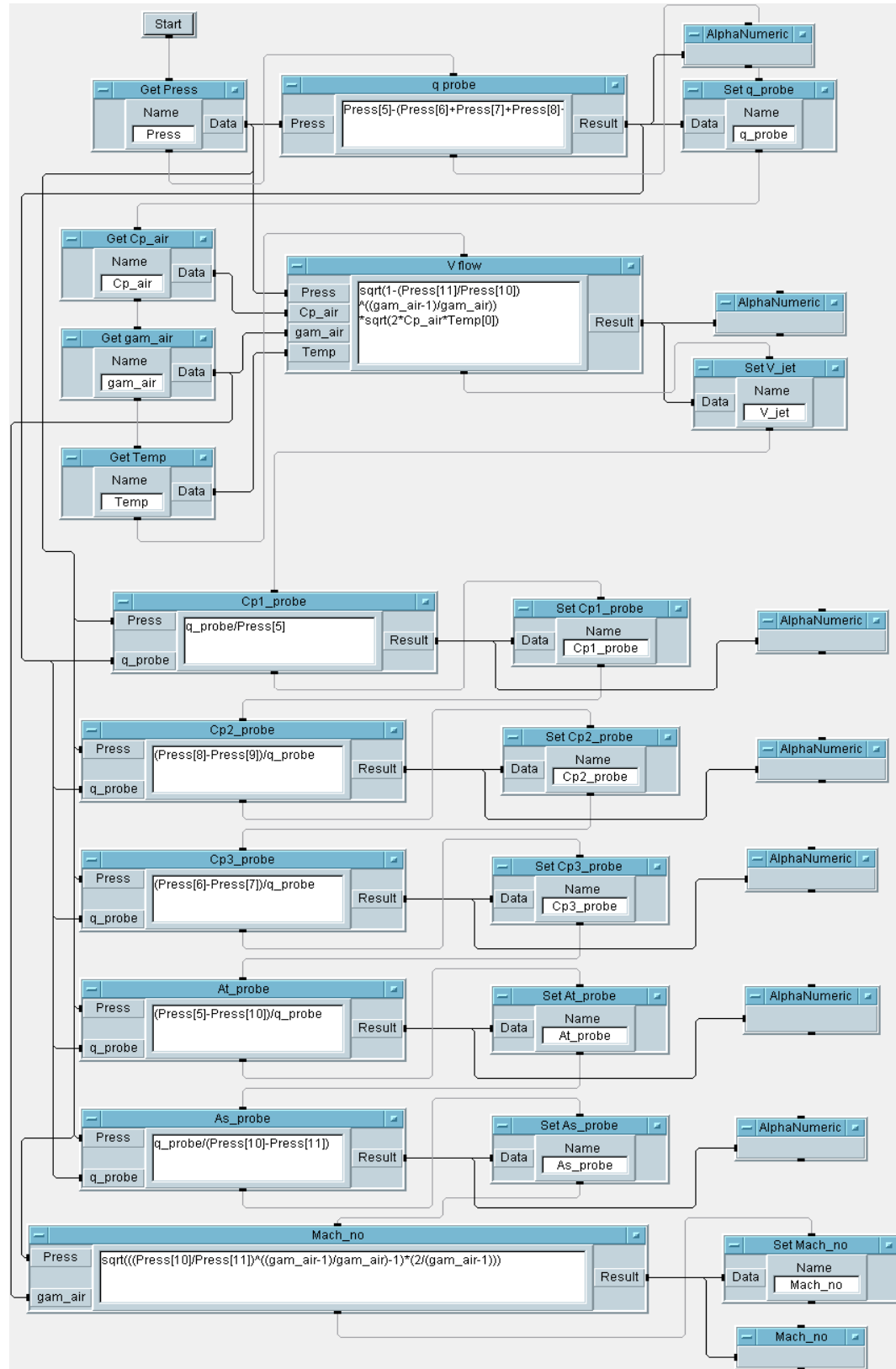
File Output User Function
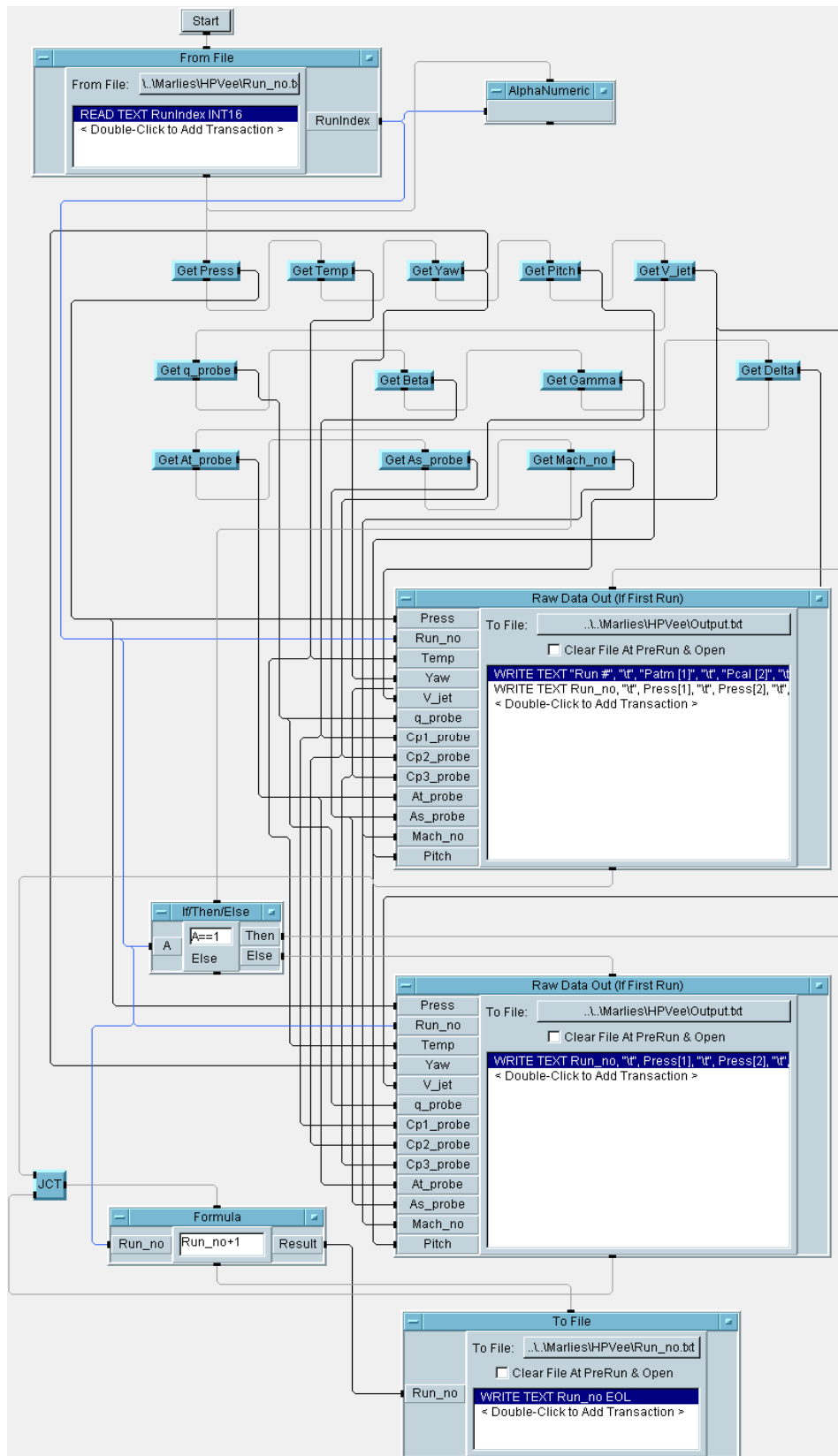
Transverse Reset User Function
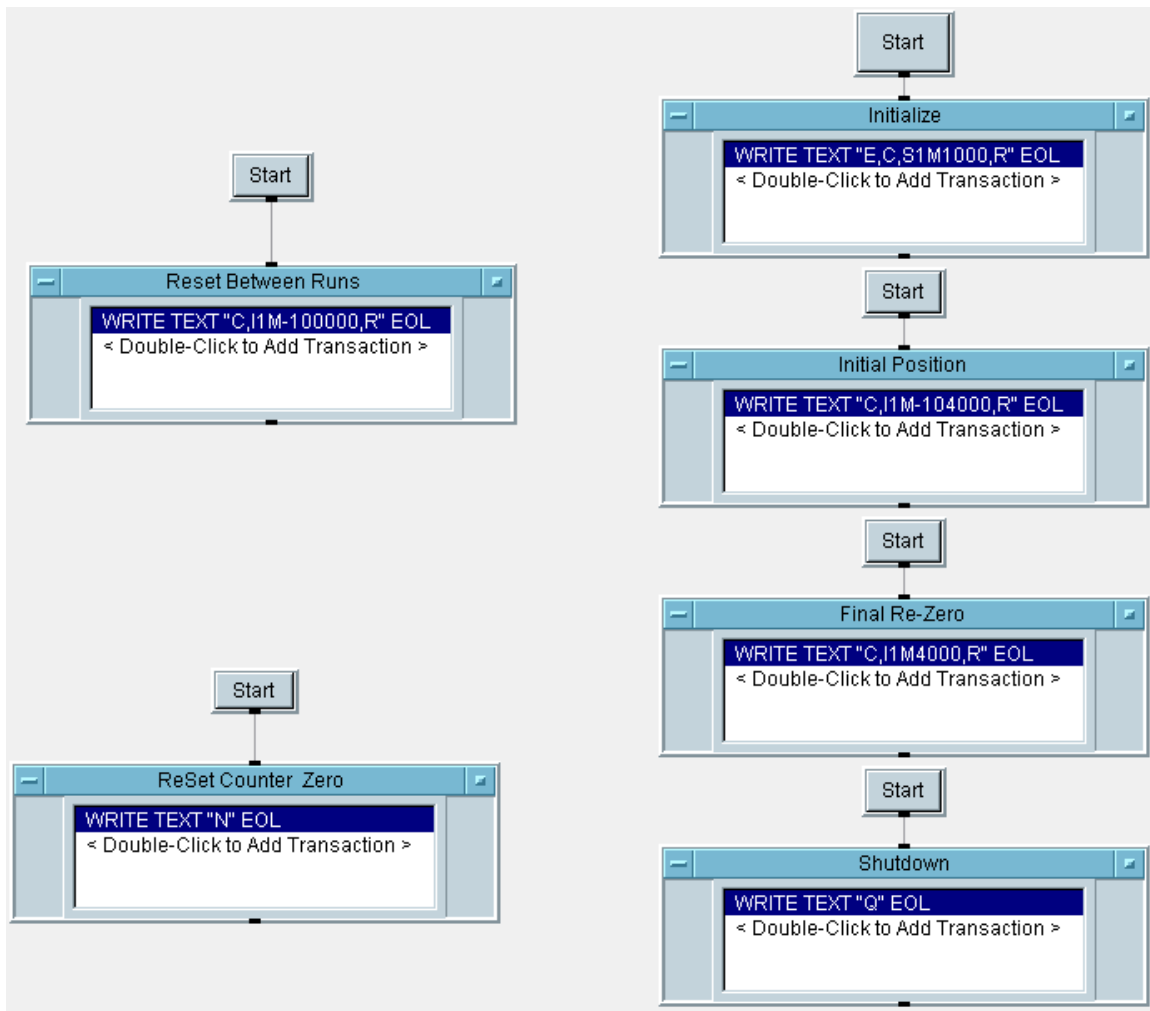
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APPENDIX D: FIVE-HOLE PROBE EQUATIONS
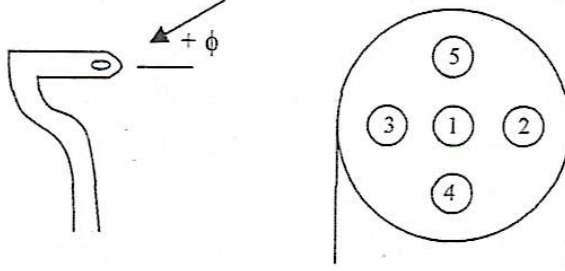
Figure 23.　　　Five-Hole Probe Port Configuration [From Ref 11]

Five-hole probe data were reduced using the following equations for both the probe calibration and final survey calculations:

Non-dimensional velocity: $X = \dfrac{V}{V_t}$ where $V_t = \sqrt{2C_p T_t}$. T_t is the stagnation temperature and C_p is specific heat at constant pressure.

Mach number sensitivity: $\beta = \dfrac{P_1 - P_{avg}}{P_1}$ where $P_{avg} = \dfrac{P_2 + P_3 + P_4 + P_5}{4}$ and subscripts 1-5 denote the ports on the probe.

Pitch sensitivity: $\gamma = \dfrac{P_4 - P_5}{P_1 - P_{avg}}$

Yaw sensitivity: $\delta = \dfrac{P_2 - P_3}{P_1 - P_{avg}}$

Loss Coefficient: $\omega = \dfrac{\overline{C_{pt1}} - \overline{C_{pt2}}}{\overline{C_{pt1}} - \overline{C_{ps1}}}$ where $\overline{C_{pt1}} = \dfrac{P_1}{P_t}$, $\overline{C_{ps1}} = \dfrac{P_s}{P_t}$, and

$$\overline{C_{pt2}} = \dfrac{\rho \displaystyle\int_0^s \dfrac{P_{t2}}{P_t} c_{z2}\, dx}{\rho \displaystyle\int_0^s c_{z2}\, dx}$$

53

For the loss coefficient calculations subscripts 1 and 2 refer to upstream and downstream cascade readings. The 't' subscript denotes Prandtl total pressure and 's' denotes Prandtl static pressure. For a five hole probe $P_{t2} = P_1$.

APPENDIX E: ADDITIONAL FIVE-HOLE PROBE PLOTS

A. INLET SURVEYS

Survey Location 3

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 5

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

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Survey Location 7

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 9

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 11

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 13

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 15

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 17

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

B. WAKE SURVEYS

Survey Location 2
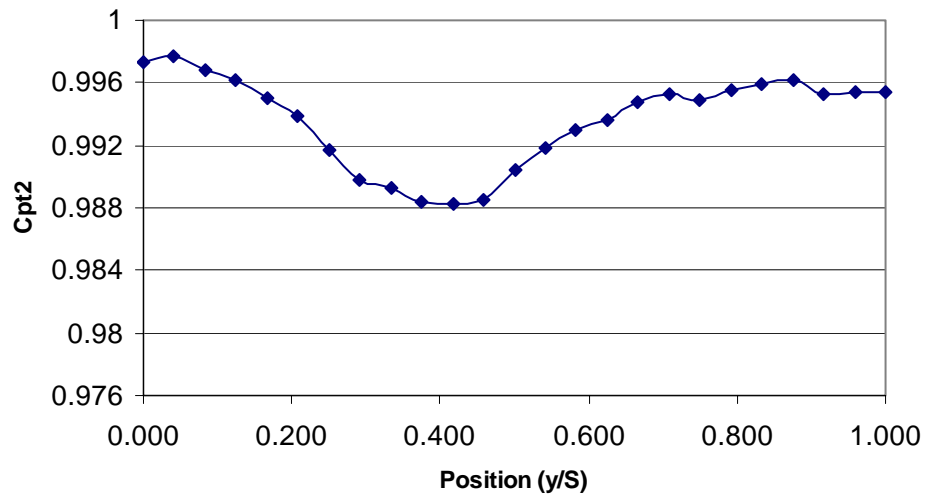
Stagnation pressure profile
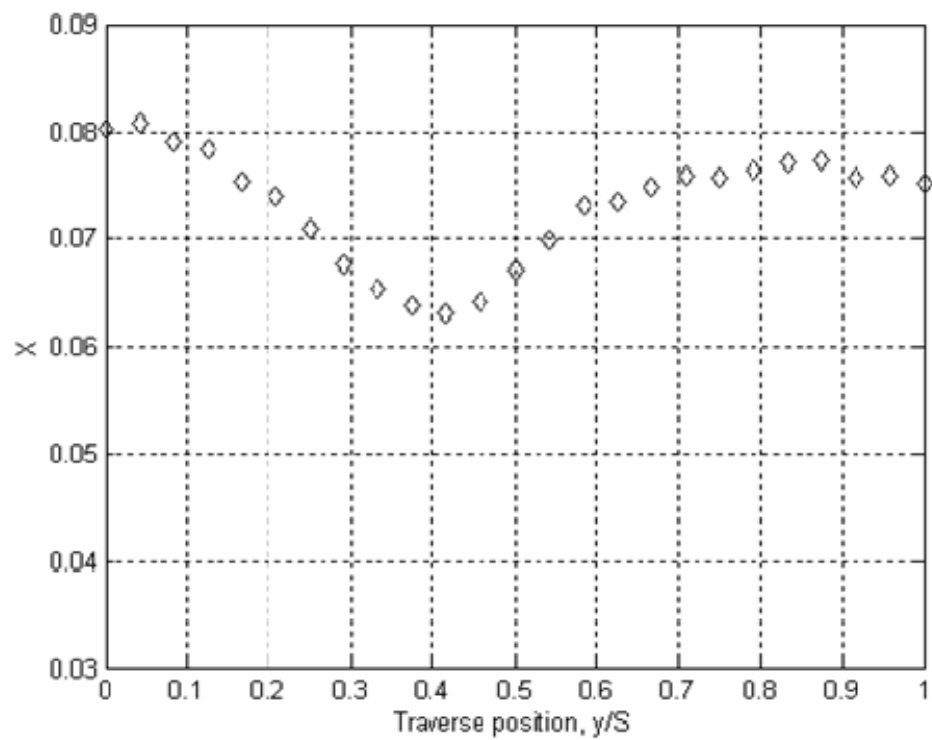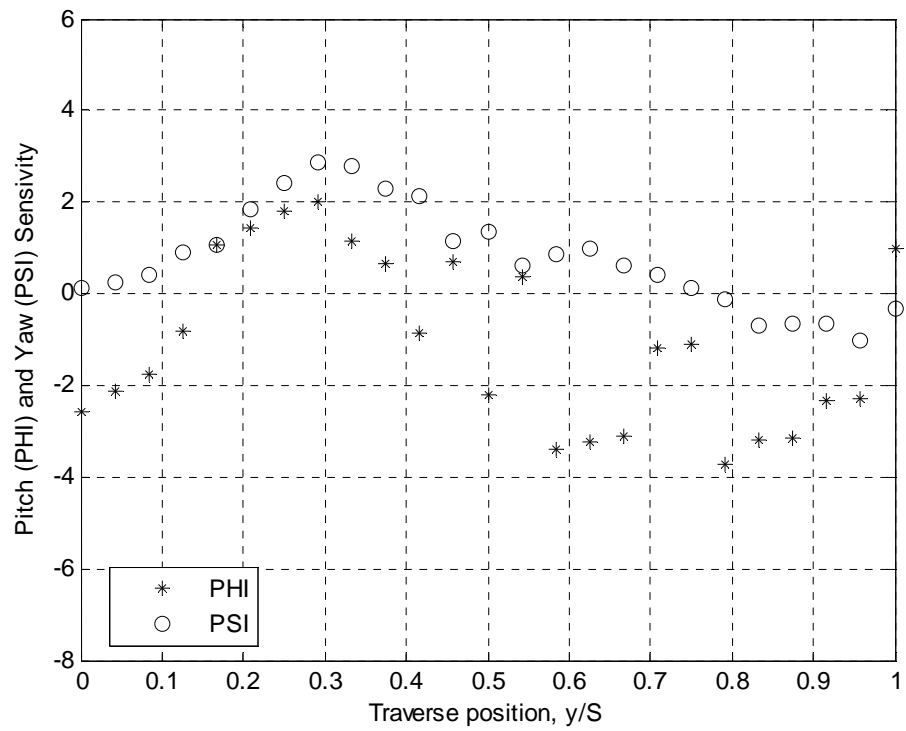
Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 3

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

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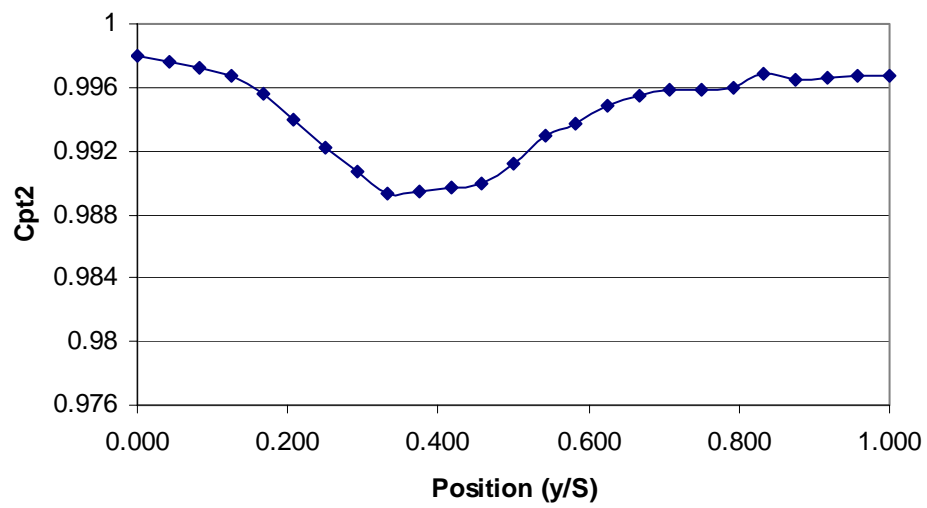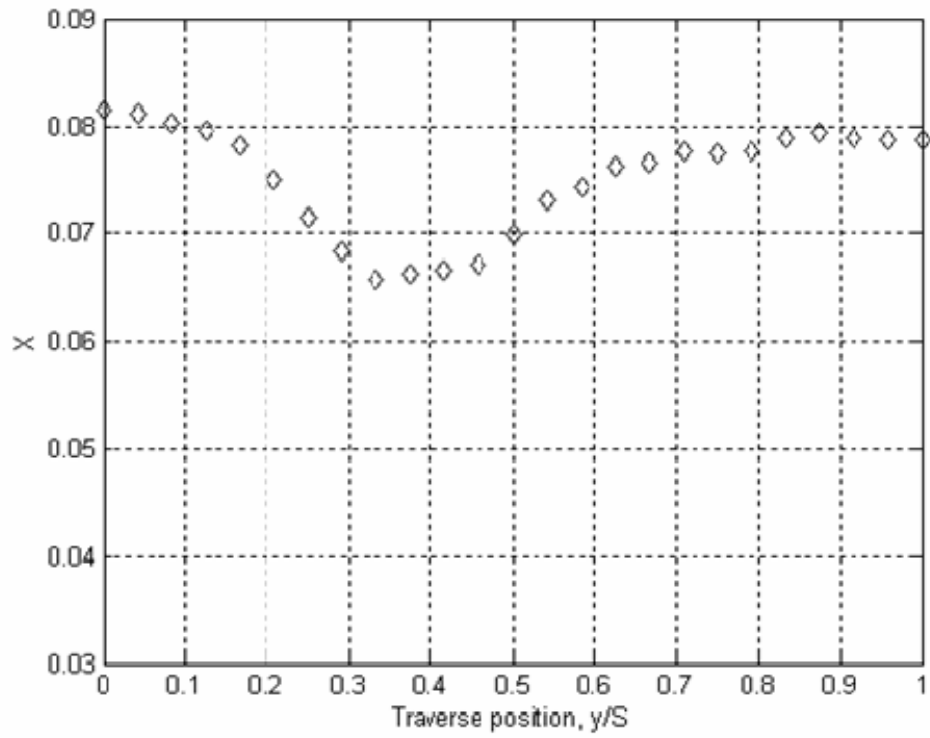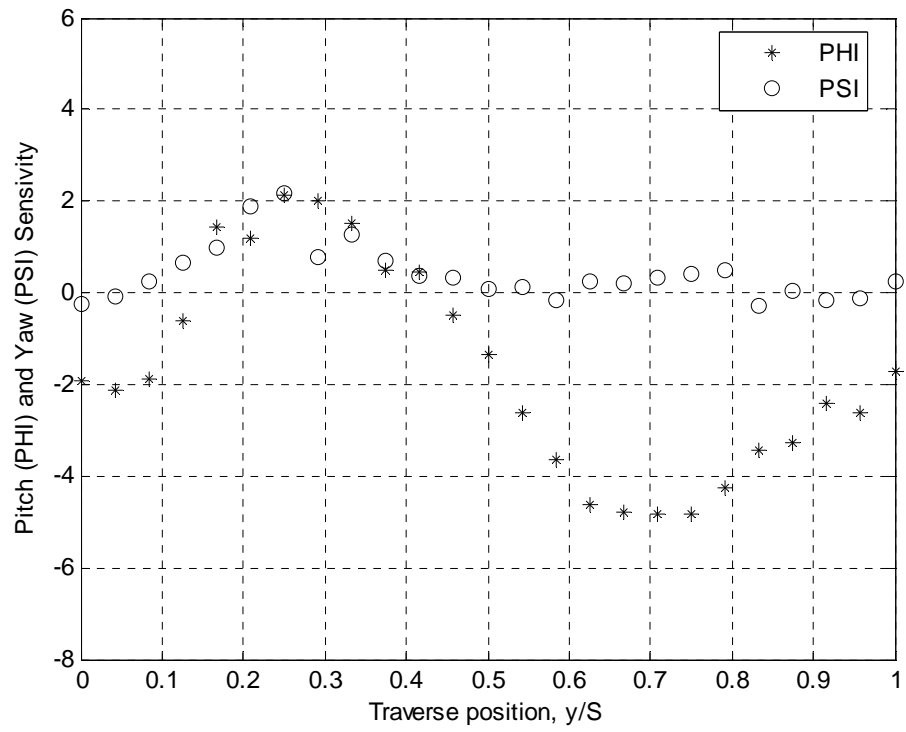
Survey Location 4

Stagnation pressure profile
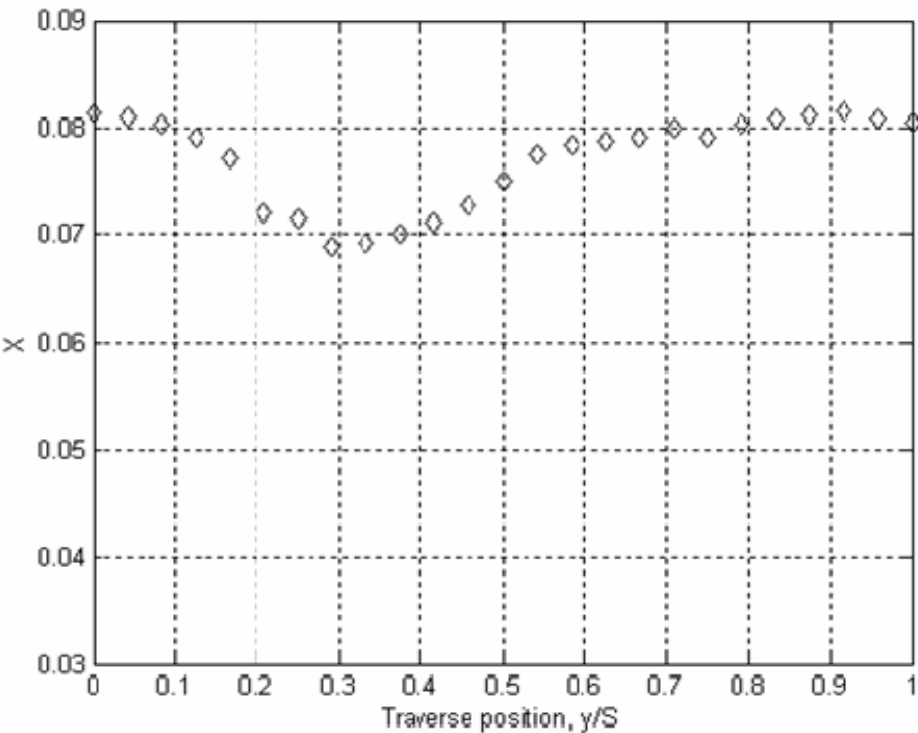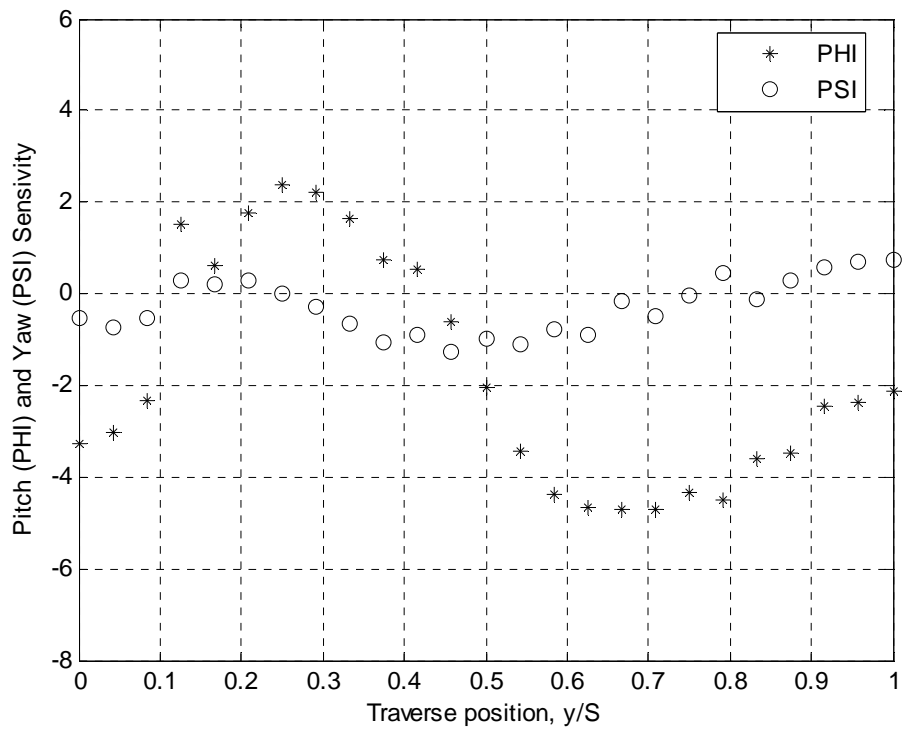
Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 5

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

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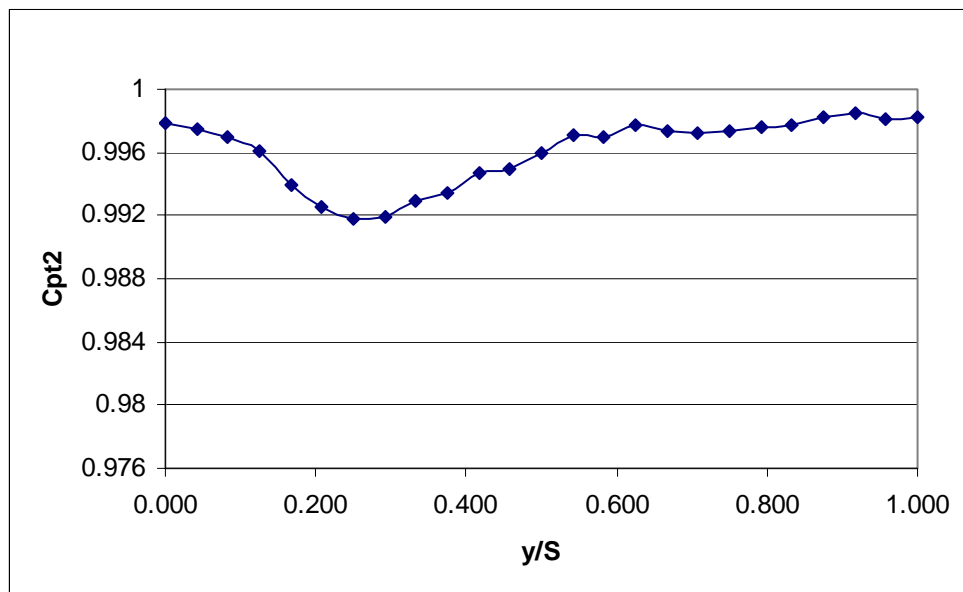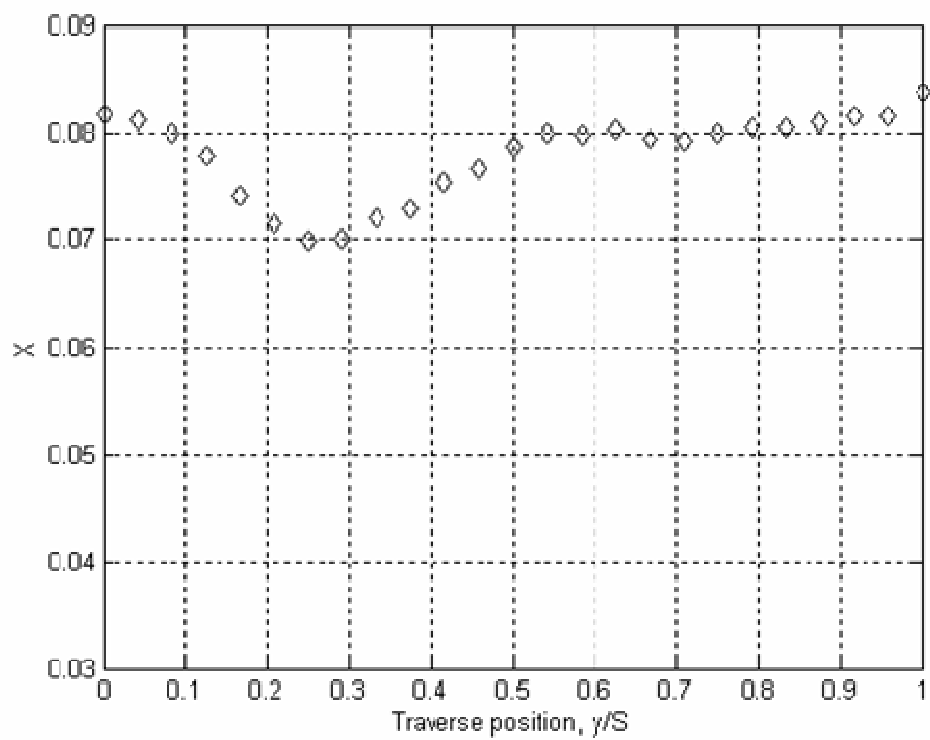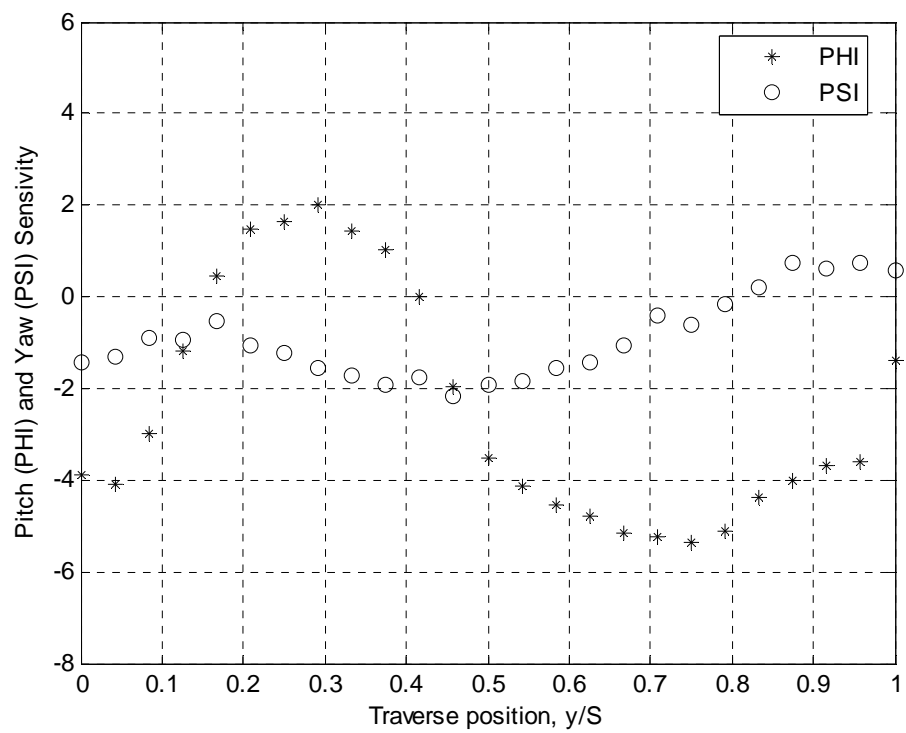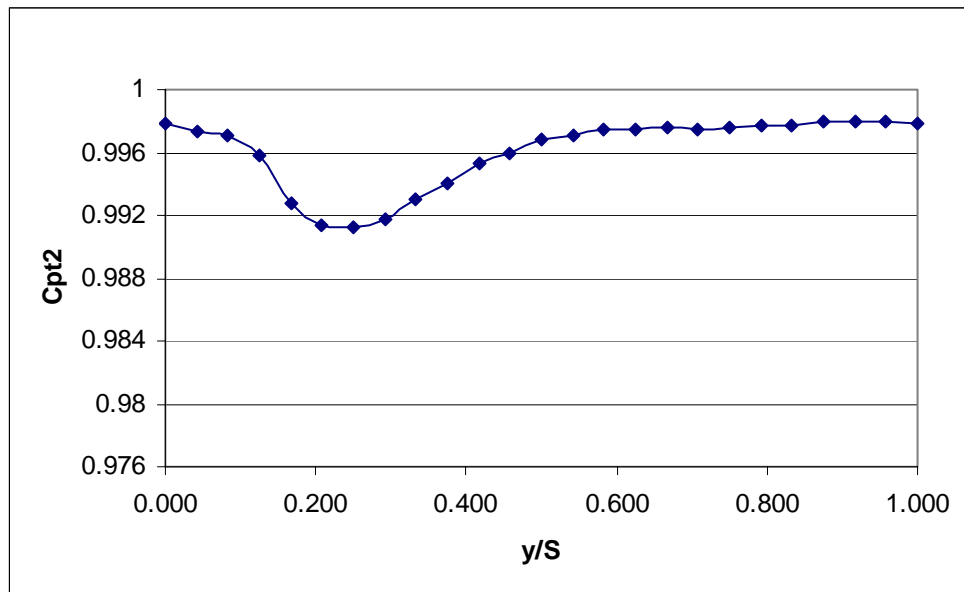
Survey Location 6

Stagnation pressure profile
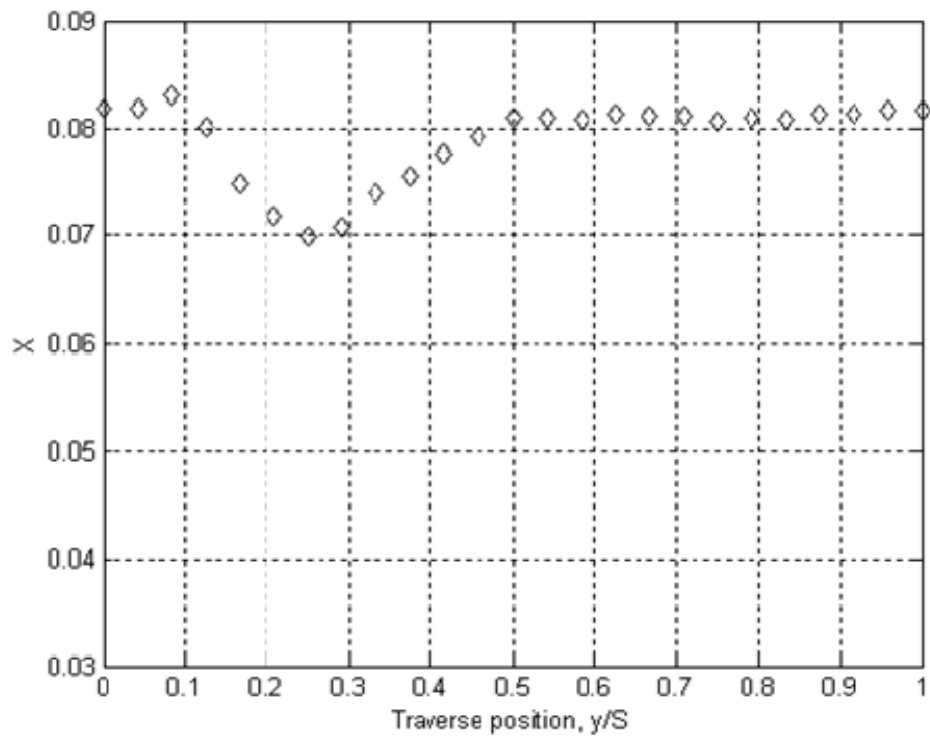
Non-dimensional velocity distribution
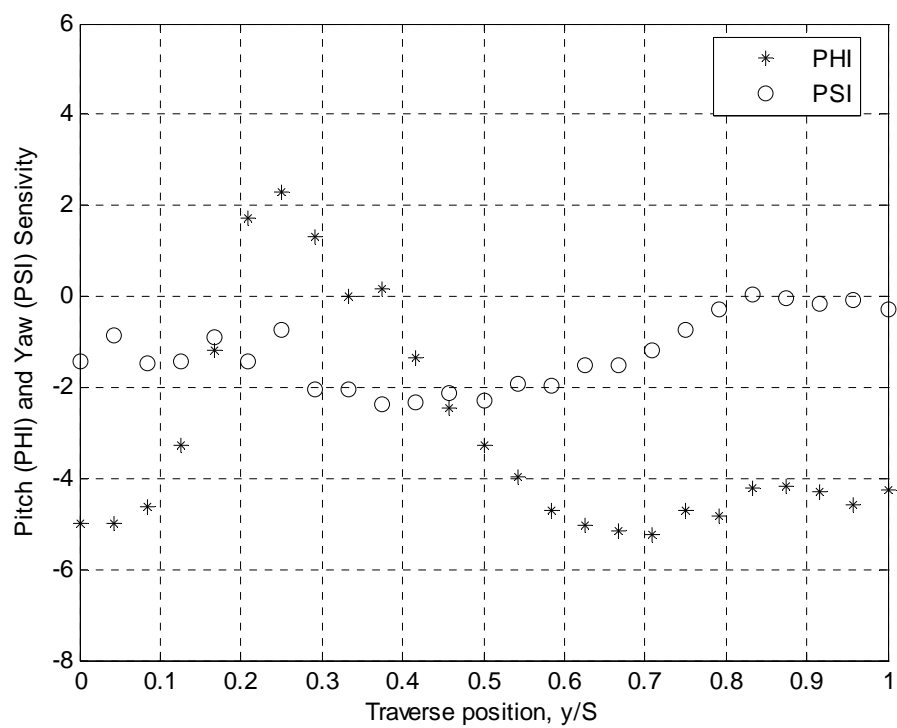
Pitch (PHI) and Yaw (PSI) distributions

Survey Location 7
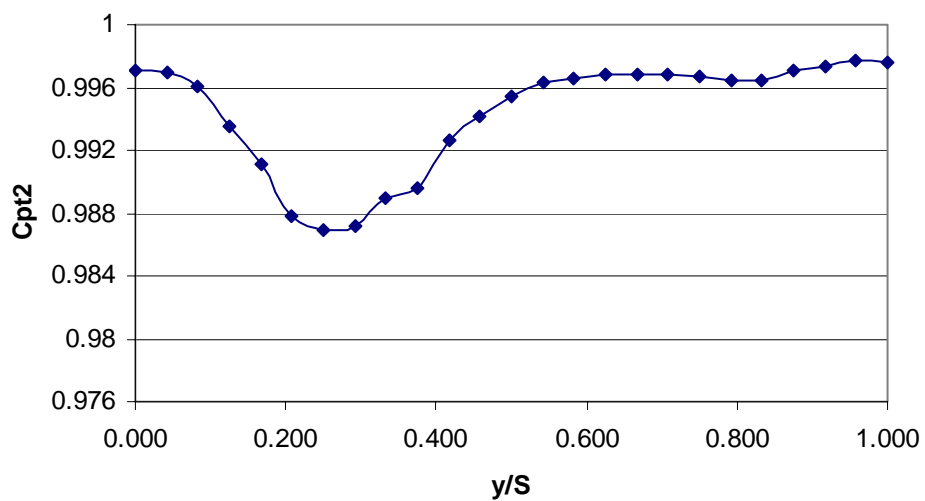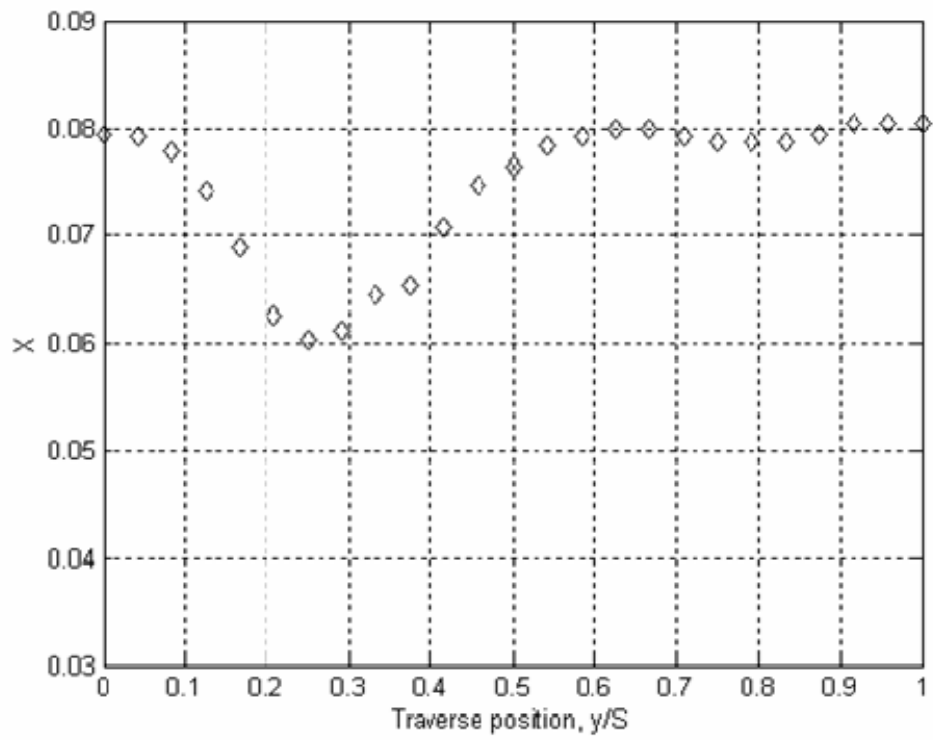
Stagnation pressure profile

Non-dimensional velocity distribution
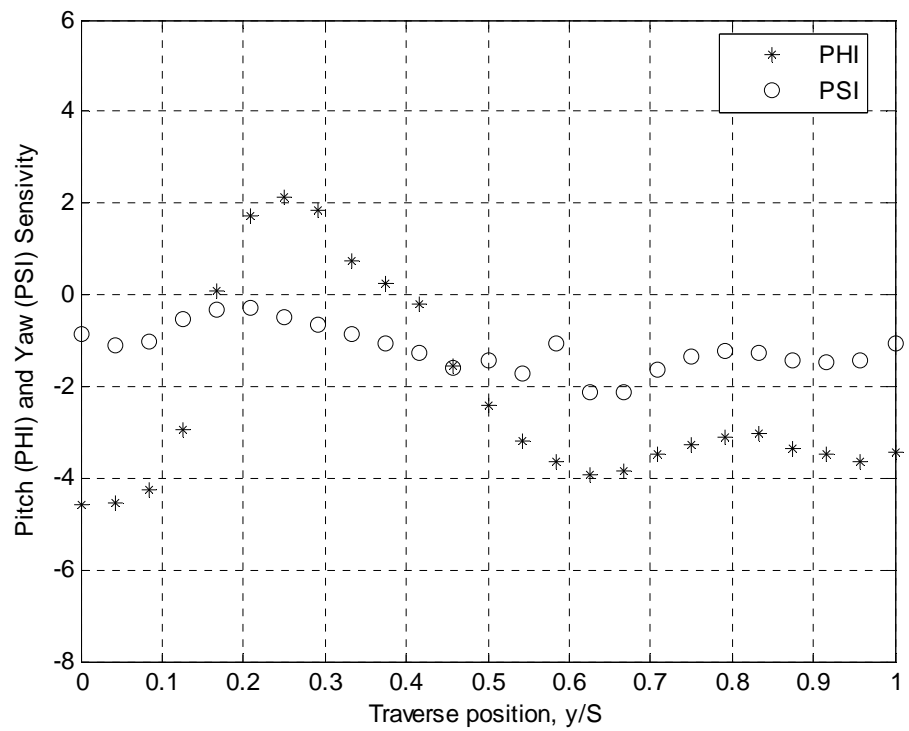
Pitch (PHI) and Yaw (PSI) distributions

Survey Location 8
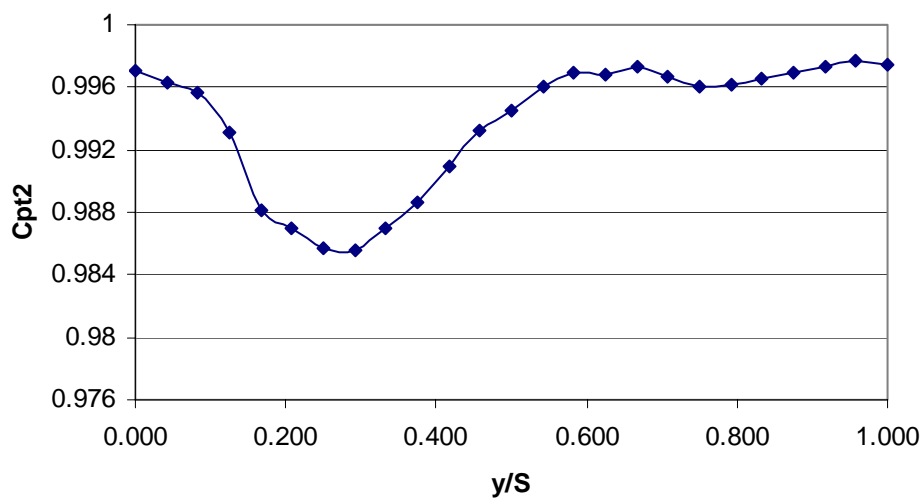
Stagnation pressure profile
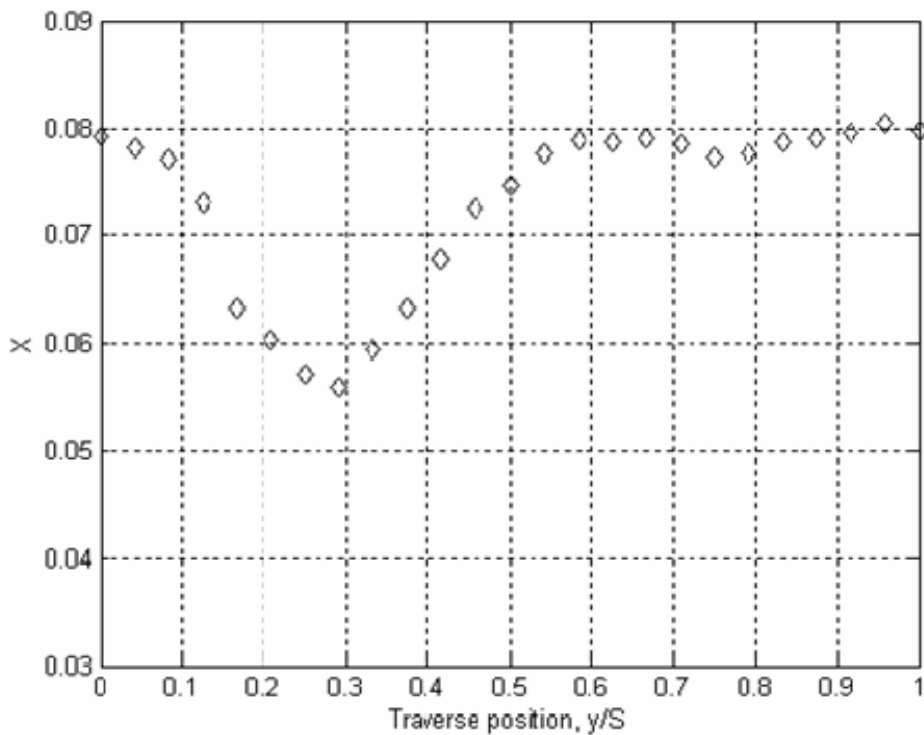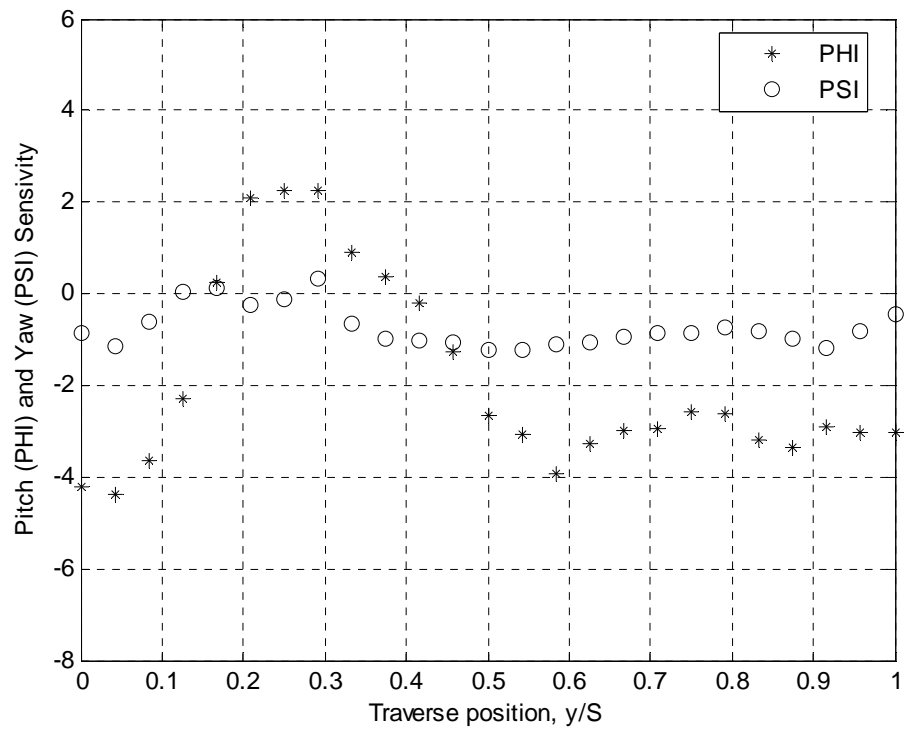
Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 9

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 10

78
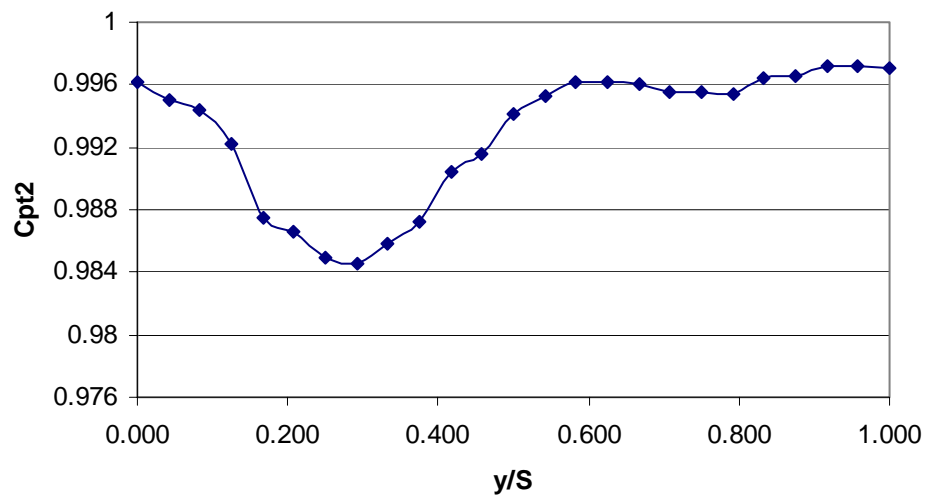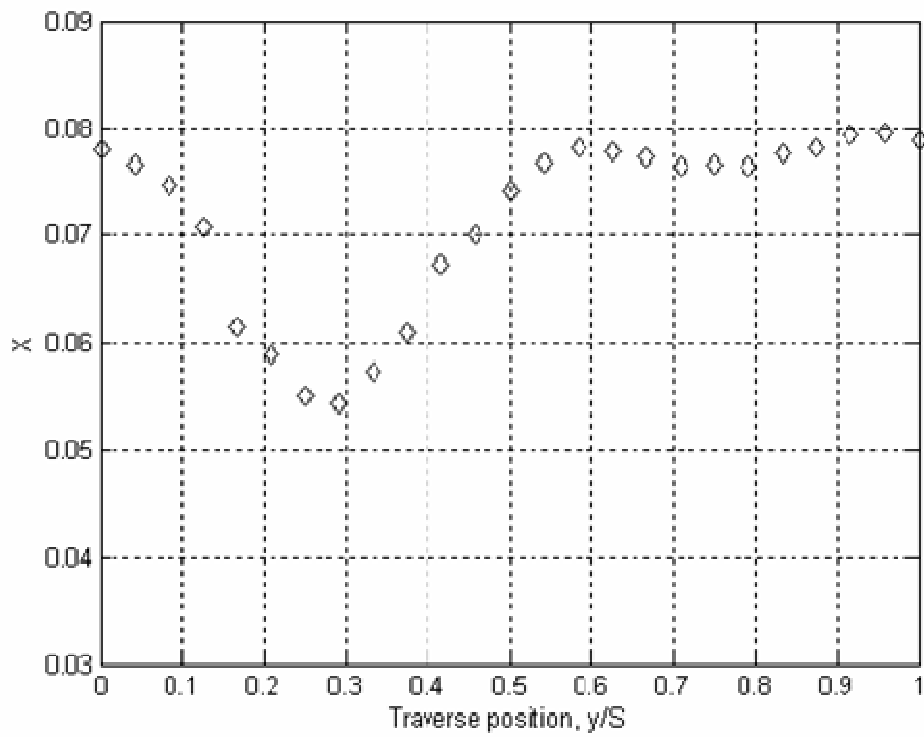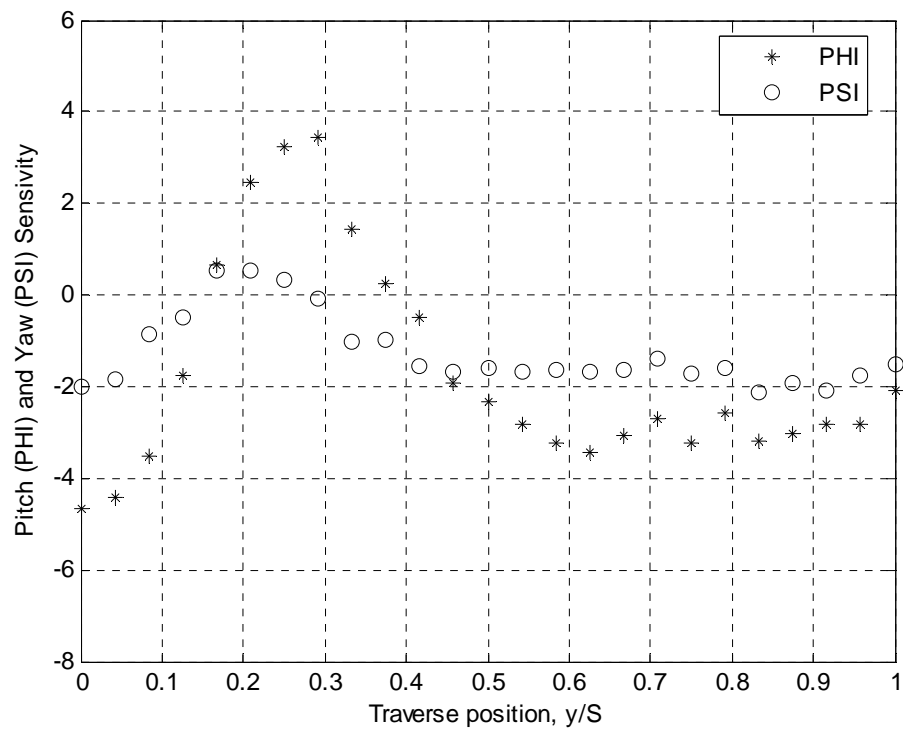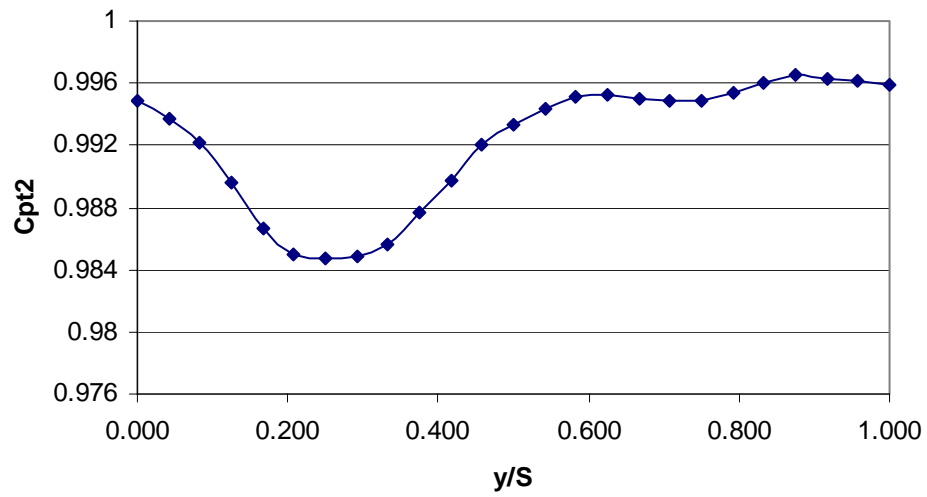
Stagnation pressure profile
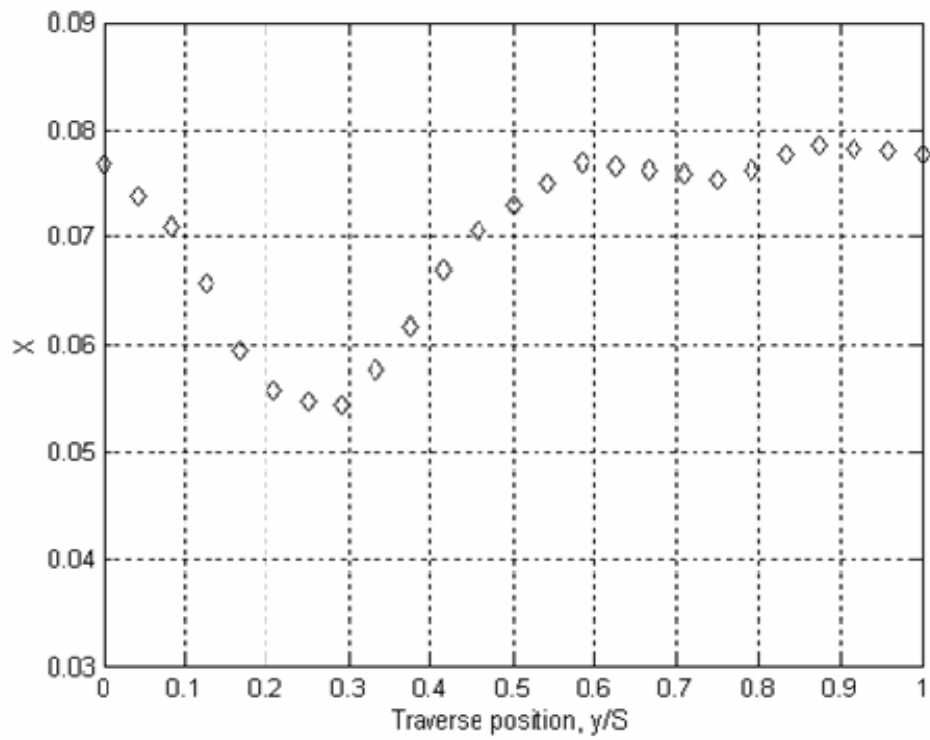
Non-dimensional velocity distribution
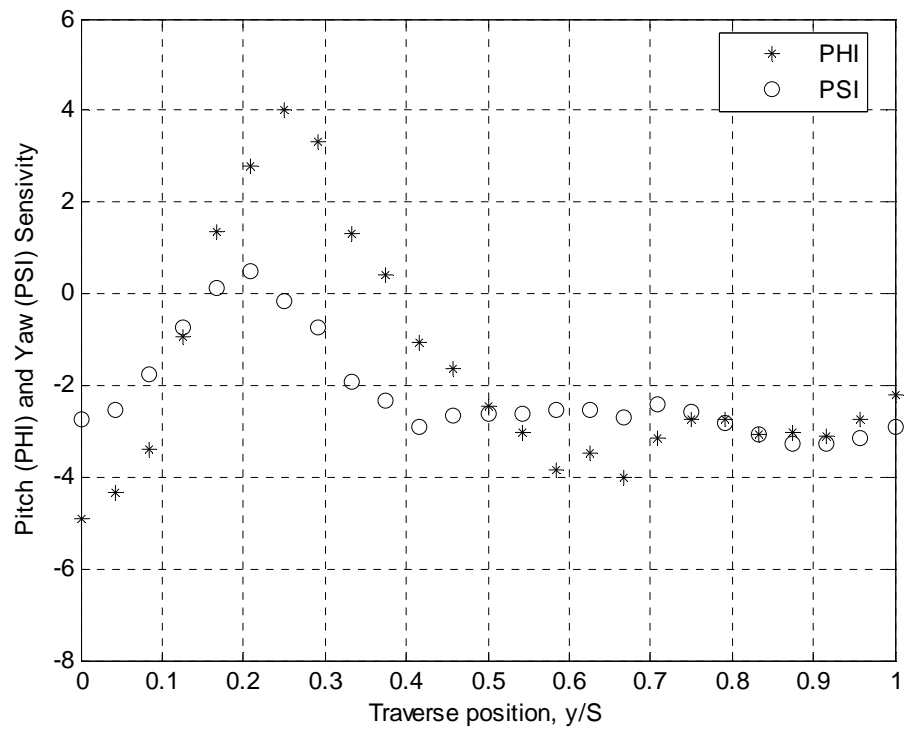
Pitch (PHI) and Yaw (PSI) distributions
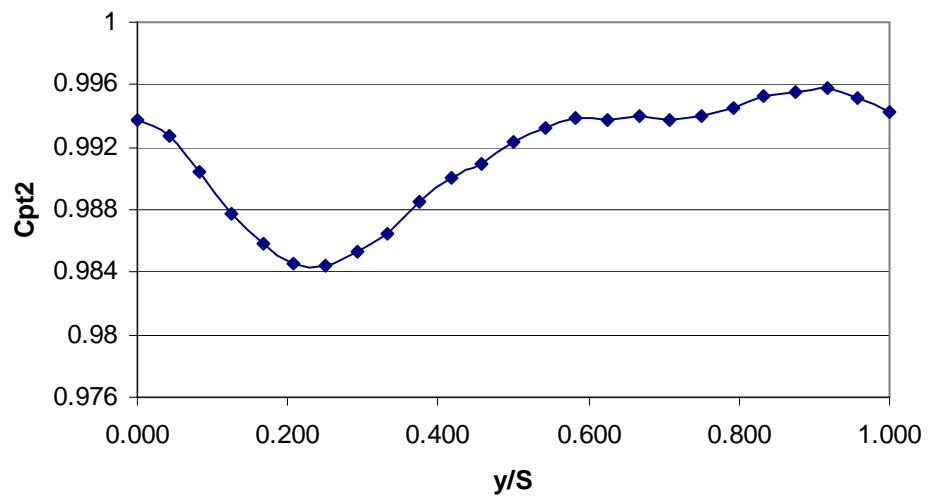
Survey Location 11

Stagnation pressure profile

Non-dimensional velocity distribution
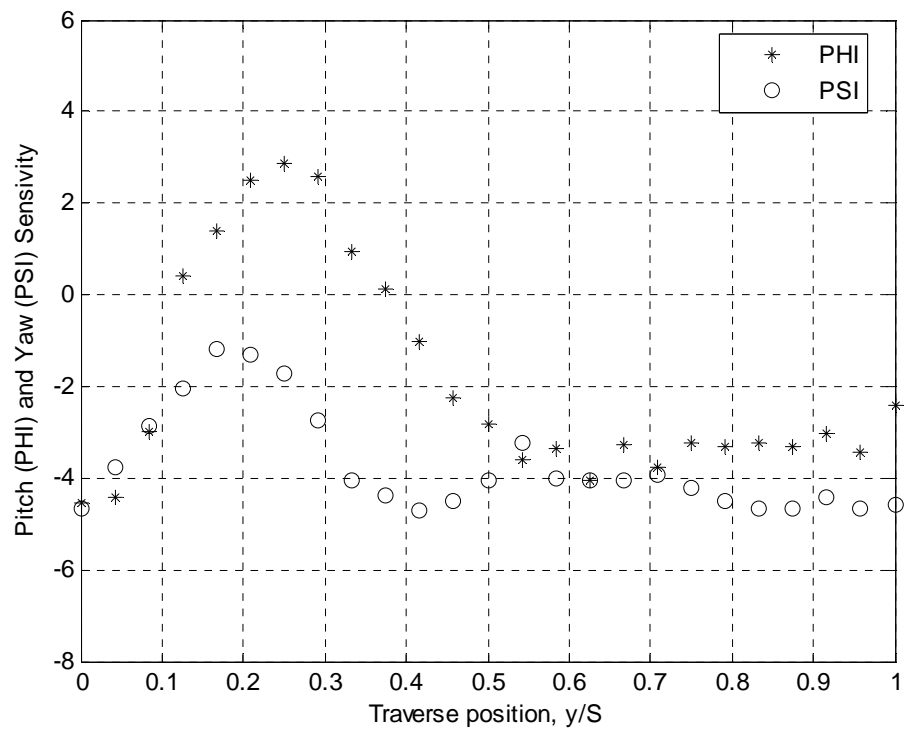
Pitch (PHI) and Yaw (PSI) distributions

Survey Location 12

Stagnation pressure profile
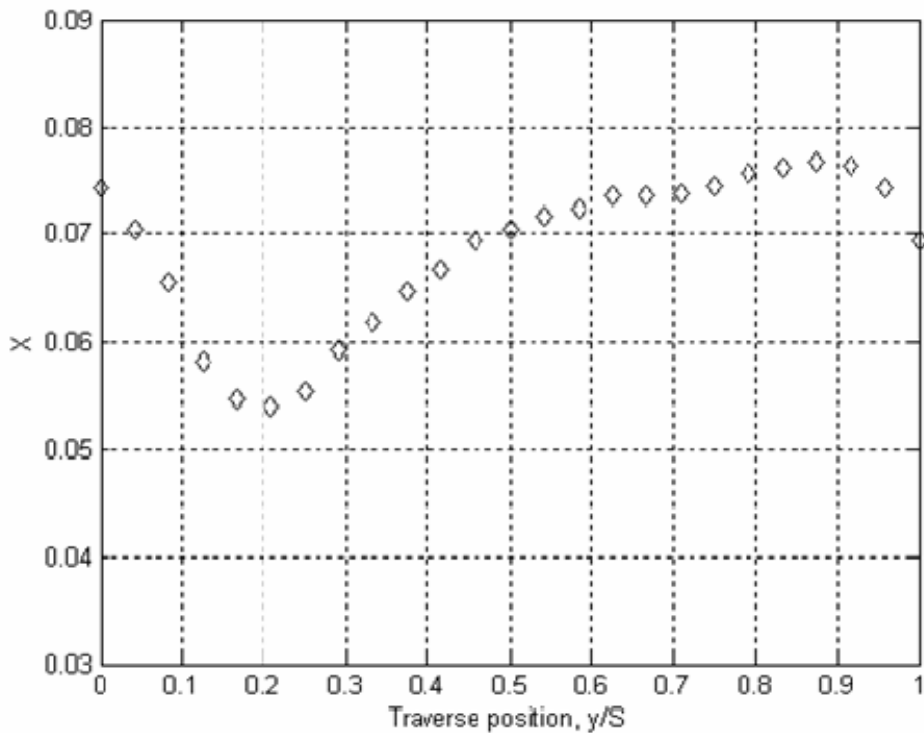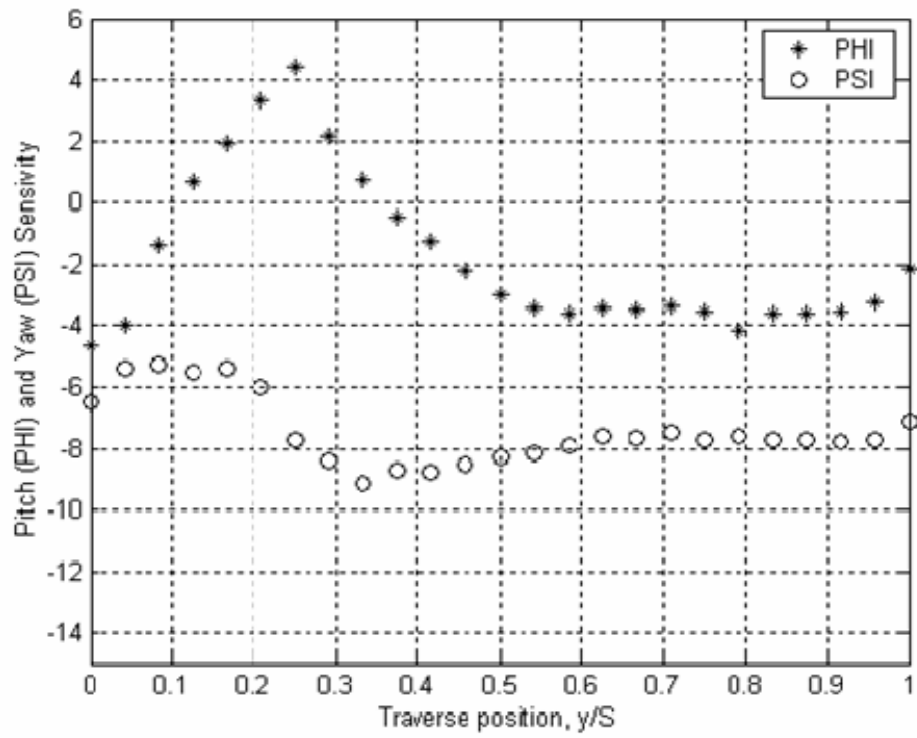
Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions
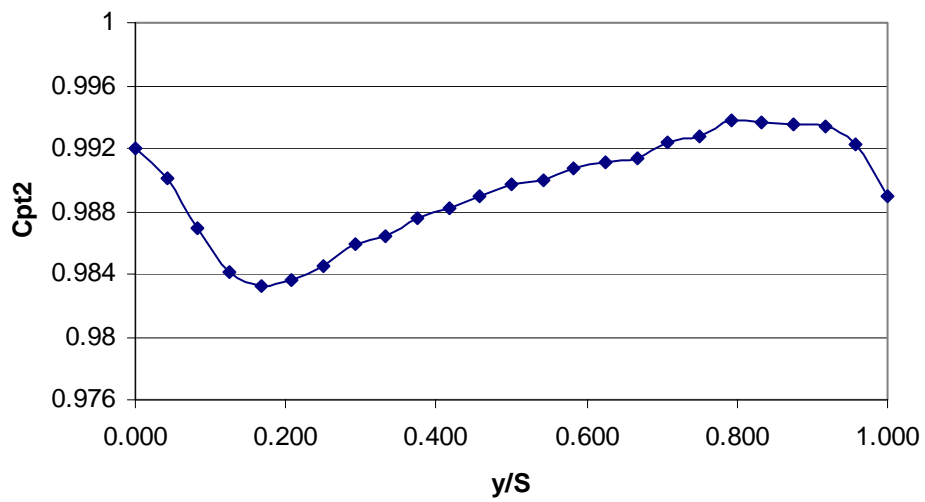
Survey Location 13

Stagnation pressure profile
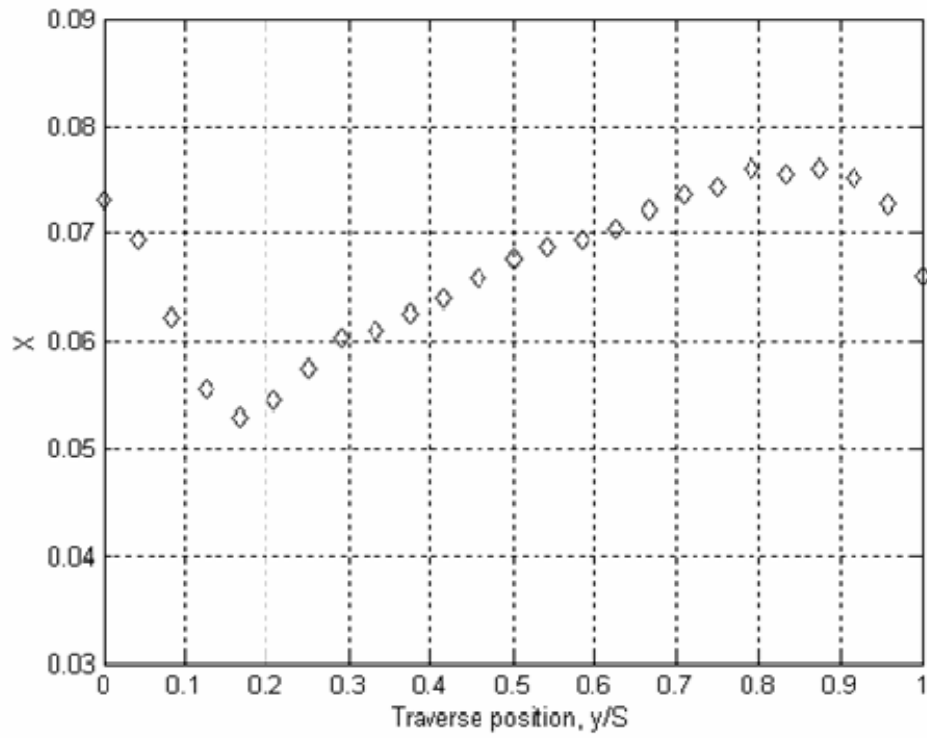
Non-dimensional velocity distribution
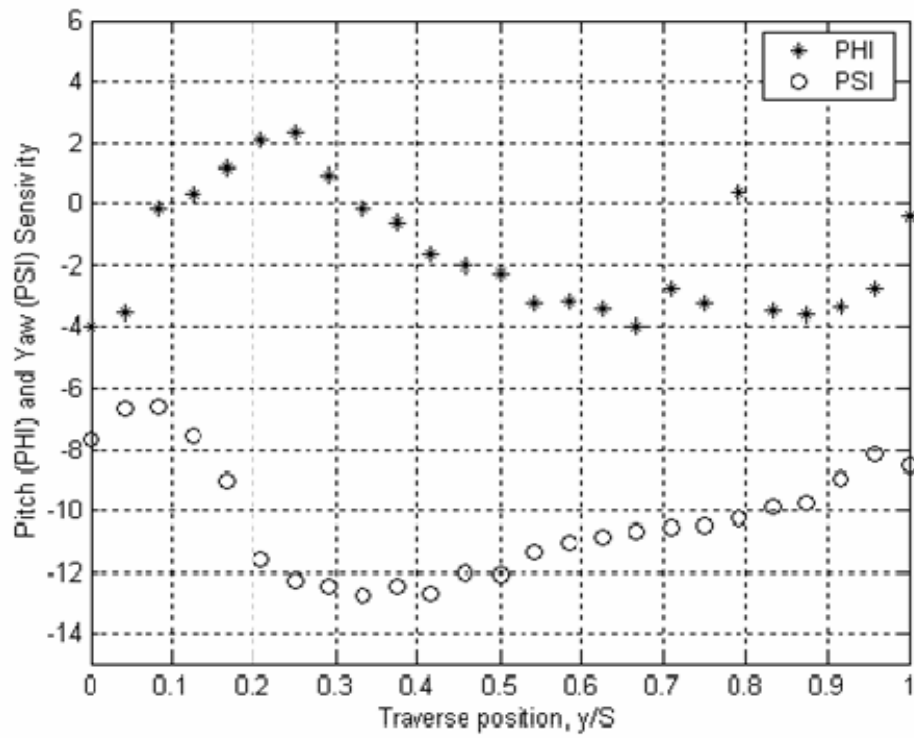
Pitch (PHI) and Yaw (PSI) distributions

Survey Location 14

Stagnation pressure profile
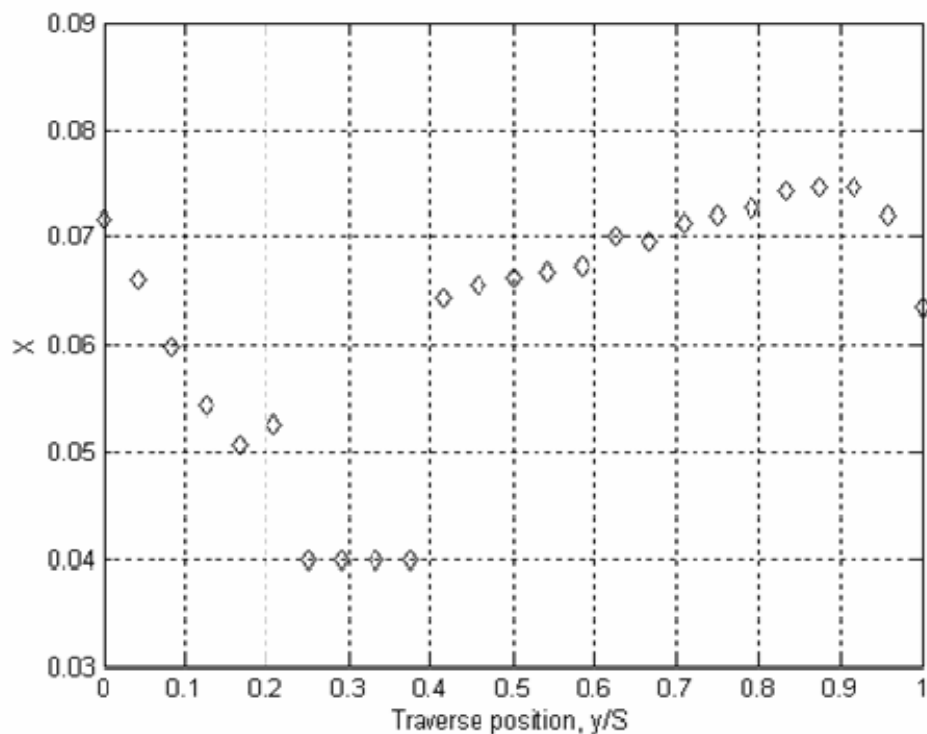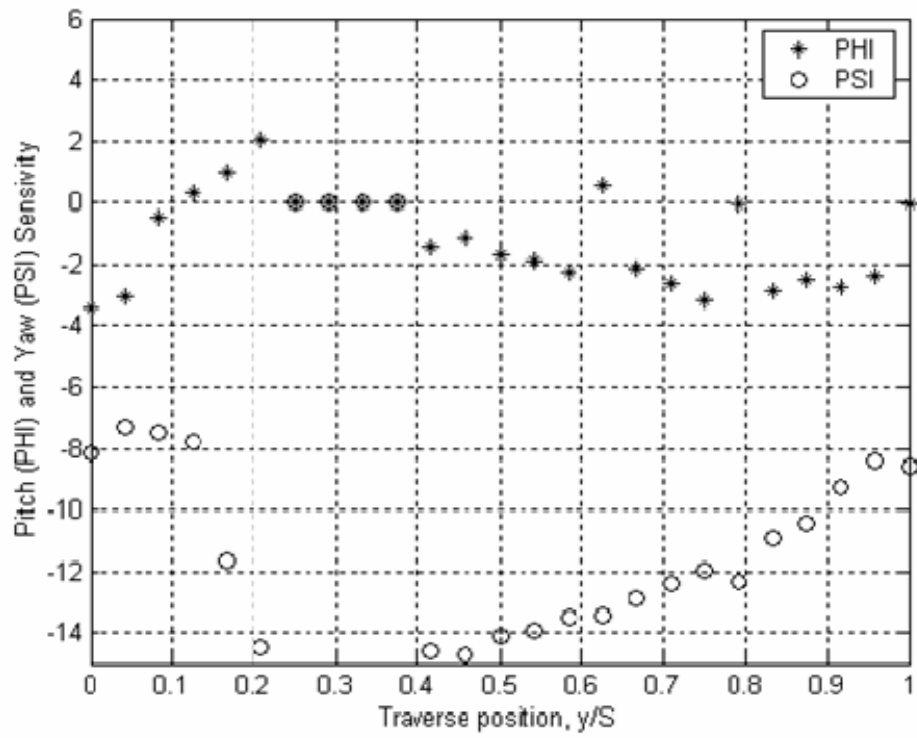
Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 15

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

87
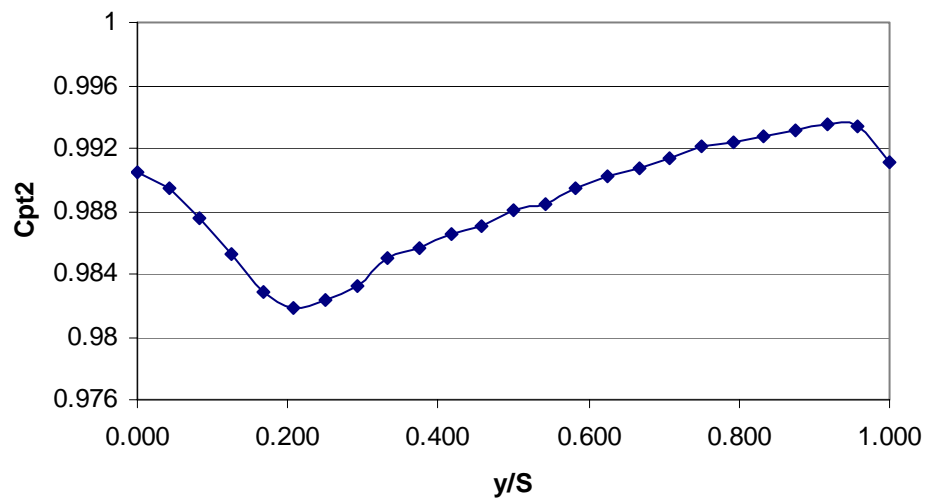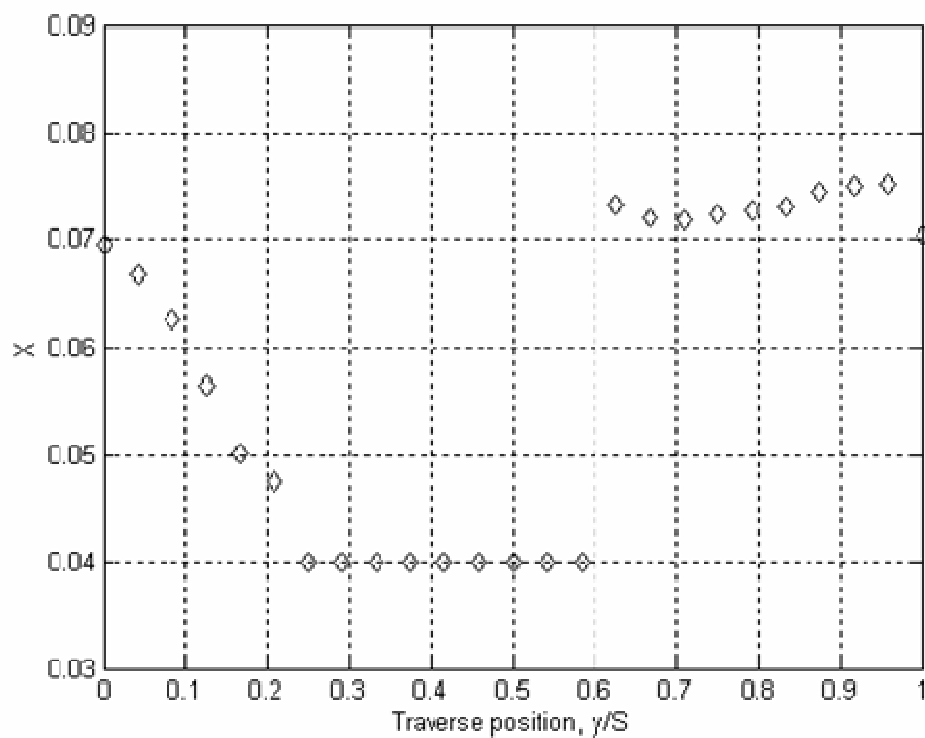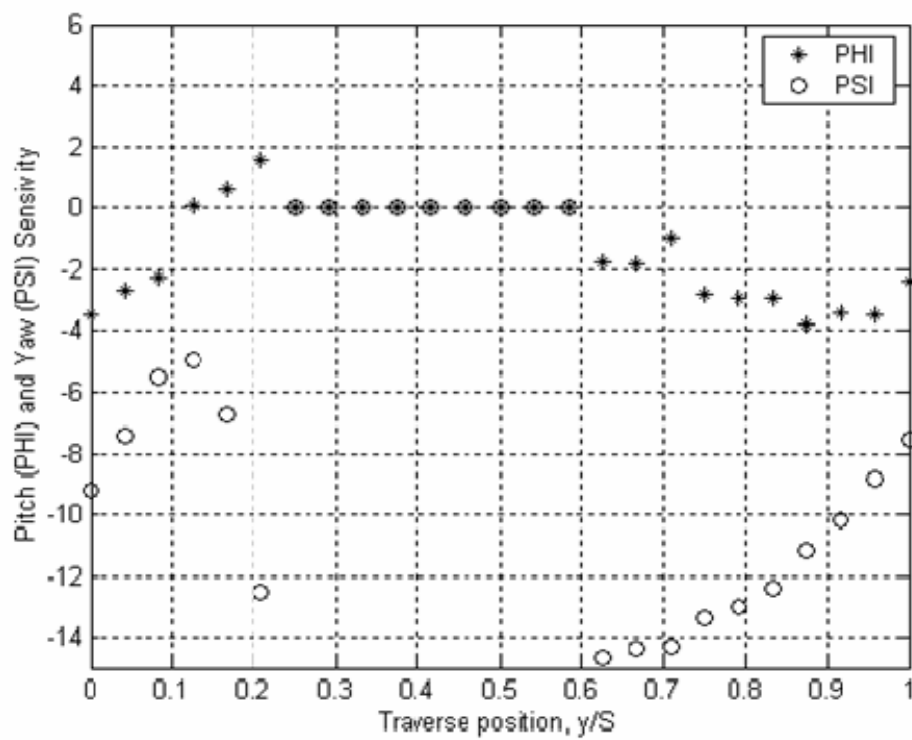
Survey Location 16

Stagnation pressure profile
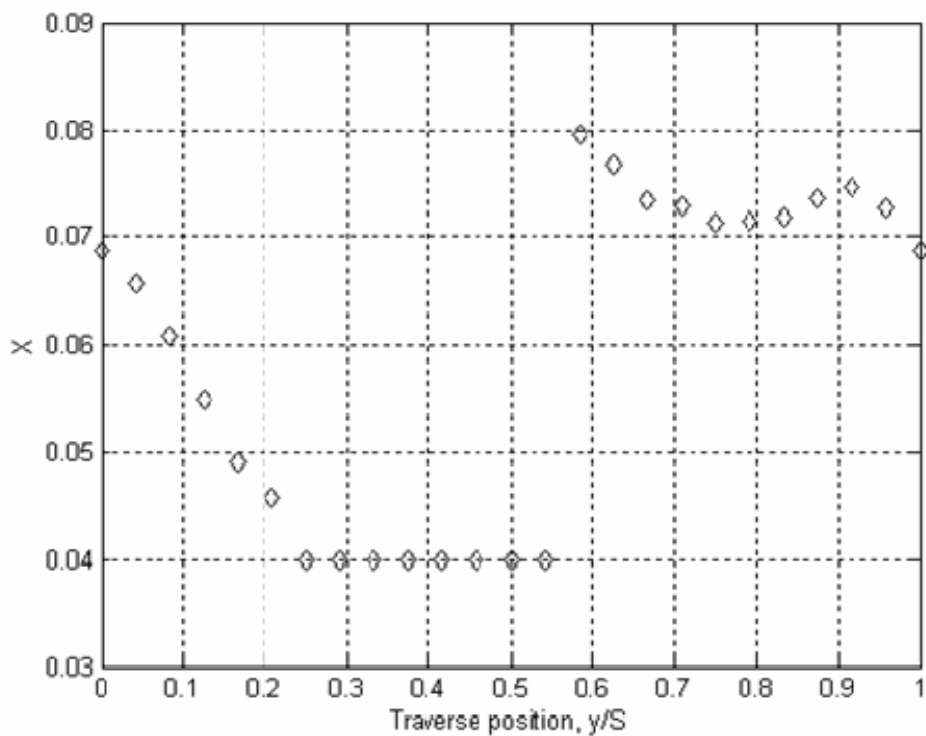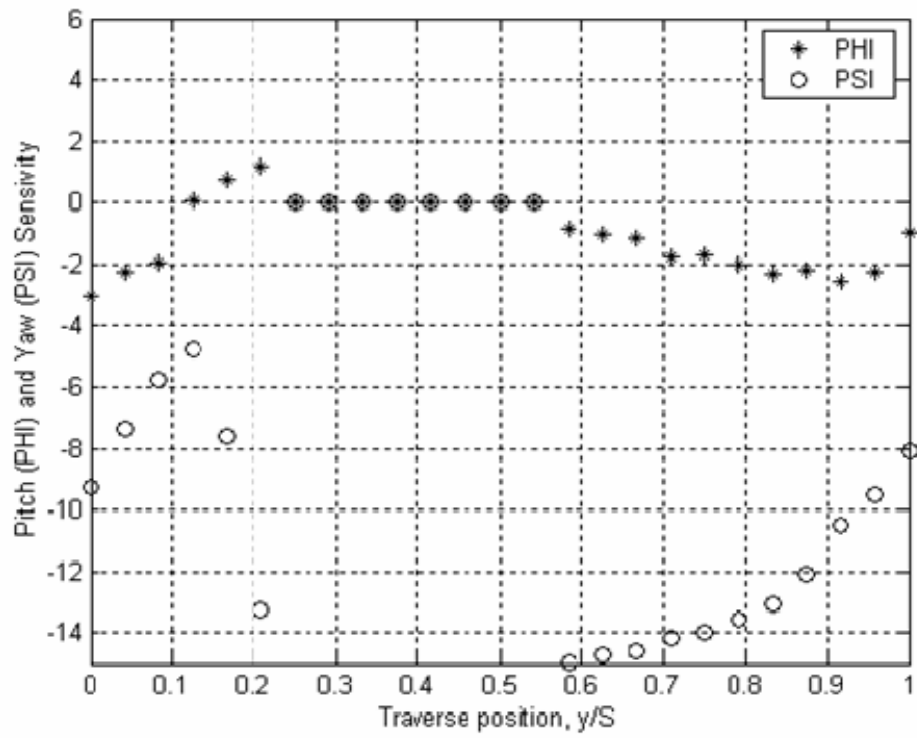
Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

Survey Location 17

Stagnation pressure profile

Non-dimensional velocity distribution

Pitch (PHI) and Yaw (PSI) distributions

90
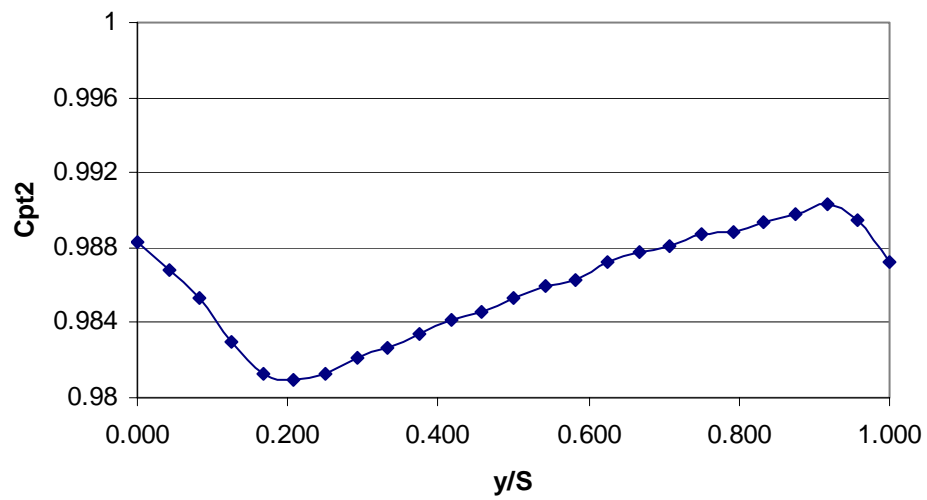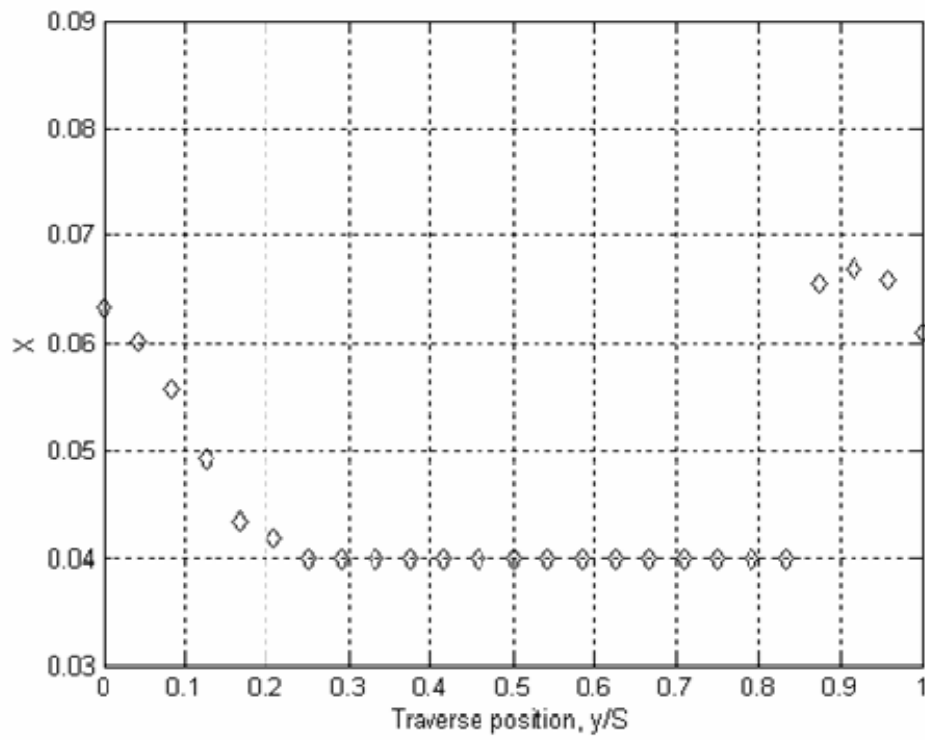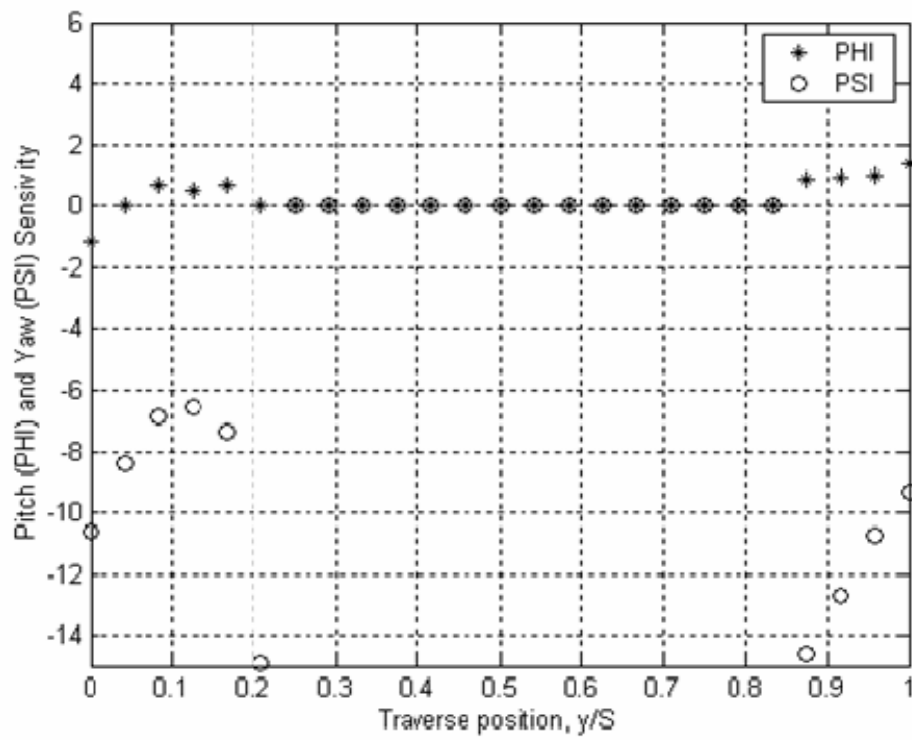
APPENDIX F: REDUCED SURVEY DATA

A. INLET SURVEYS

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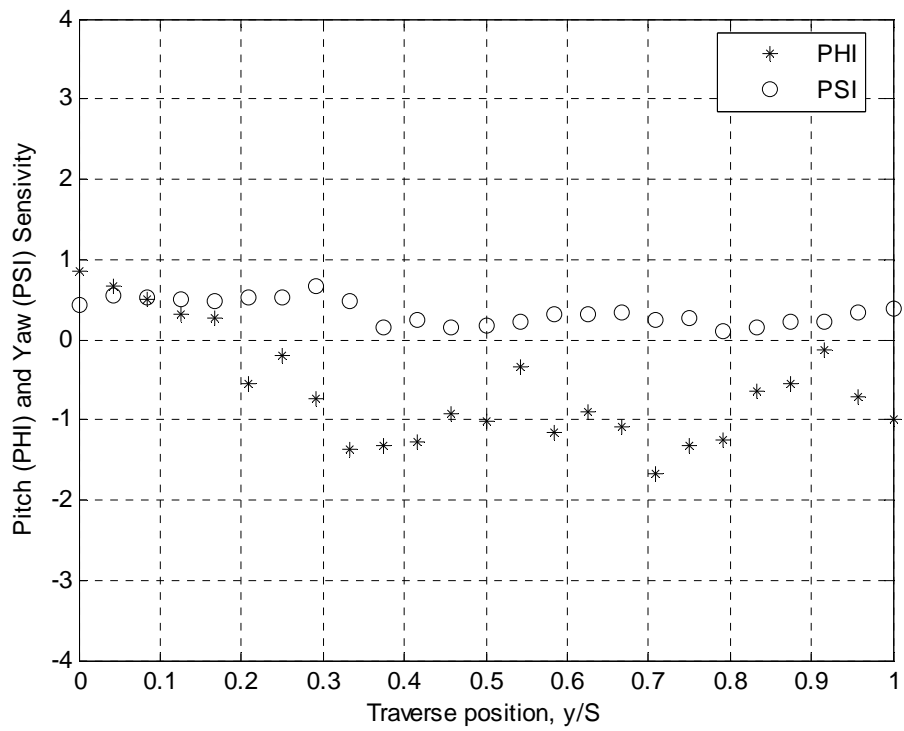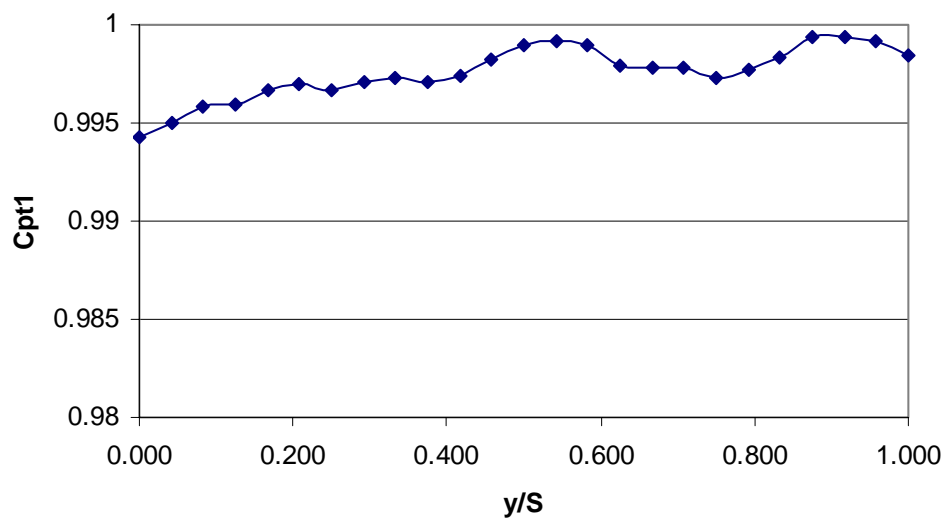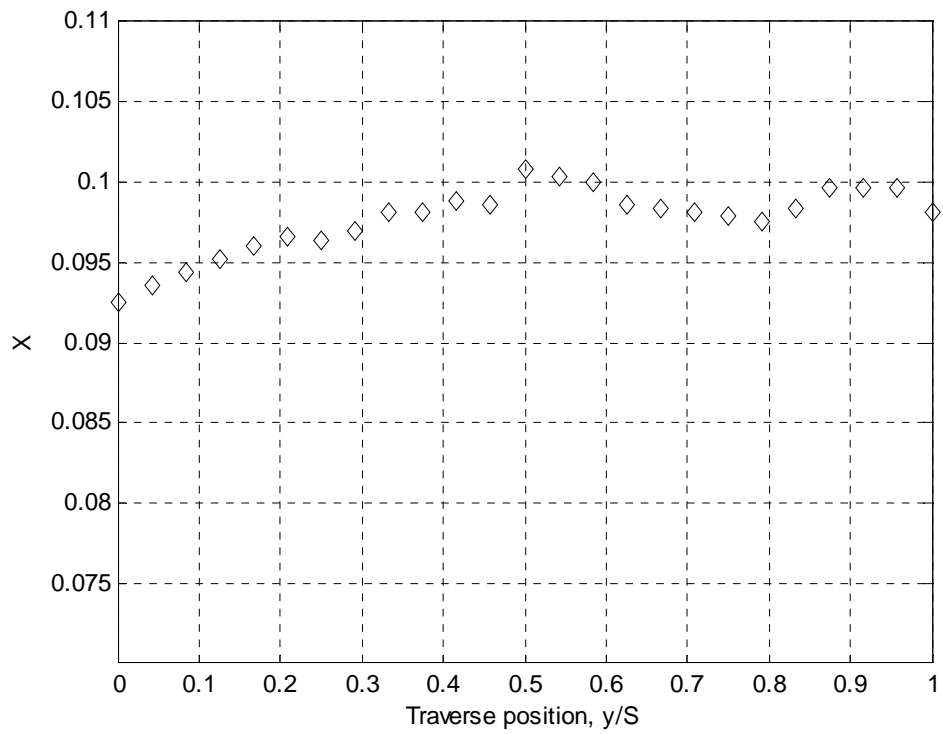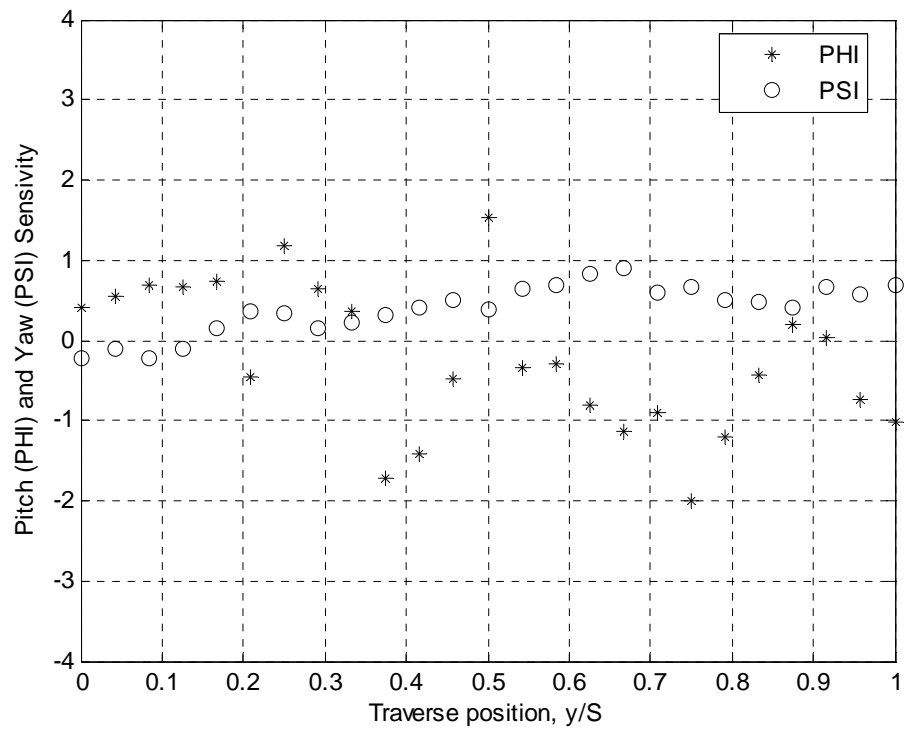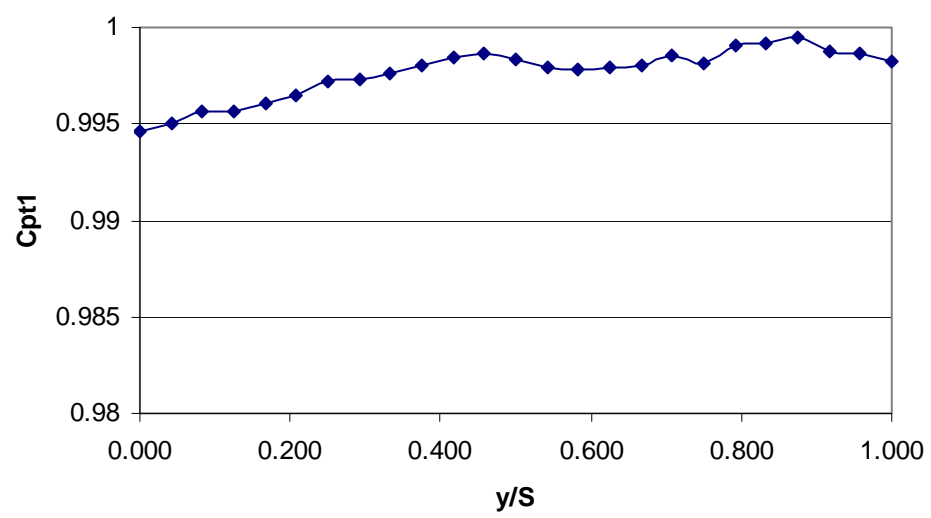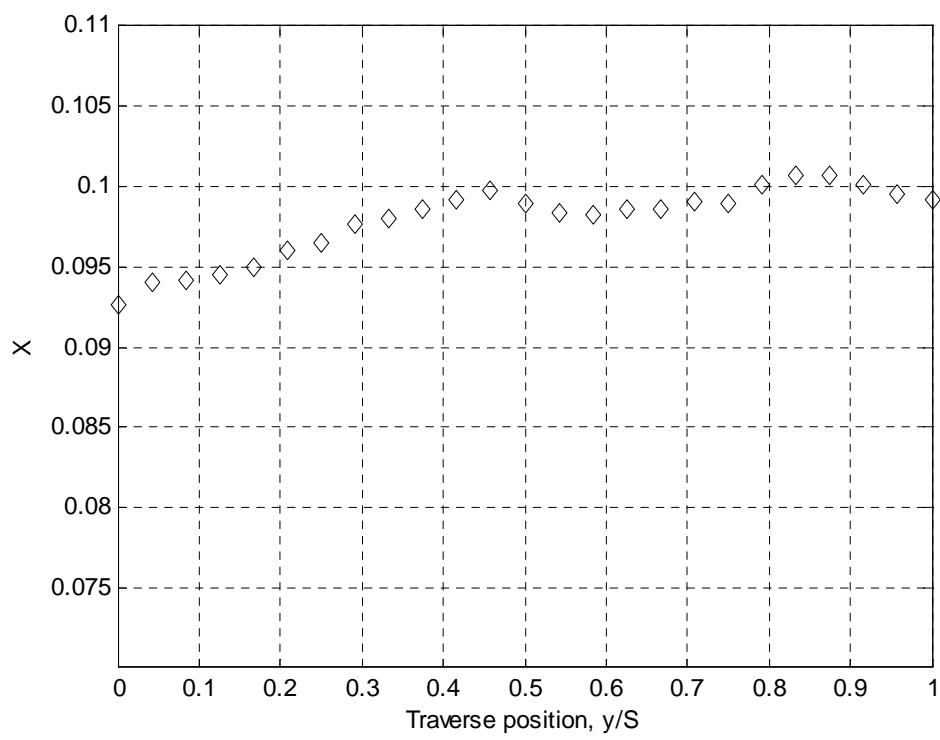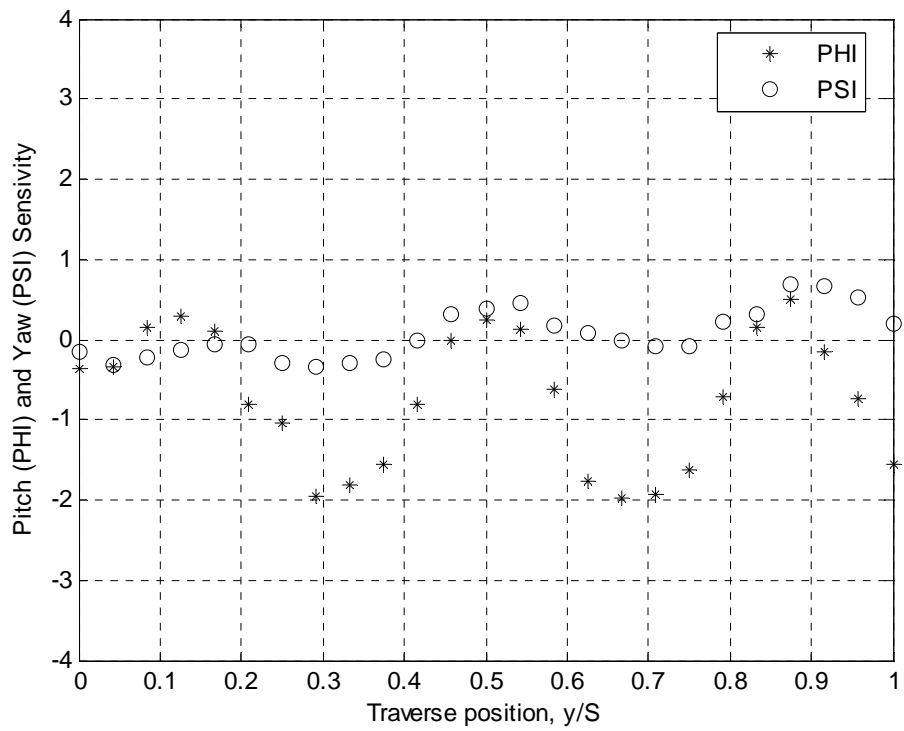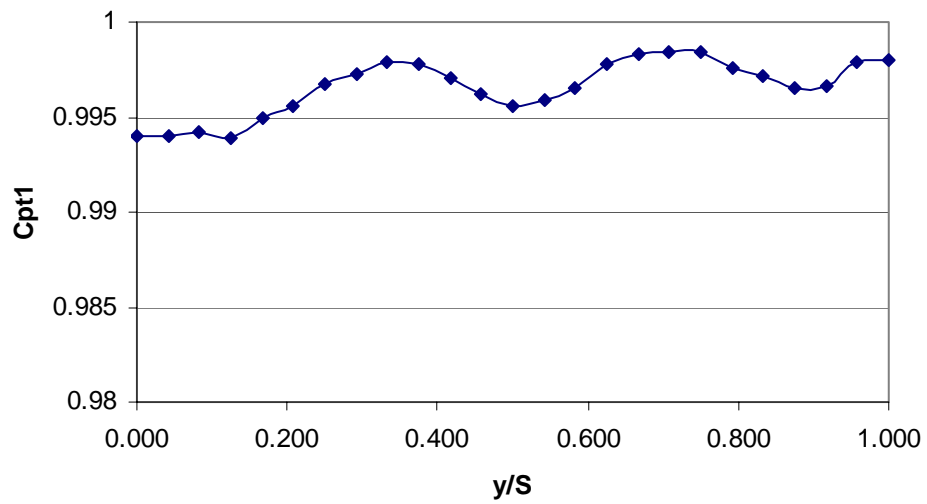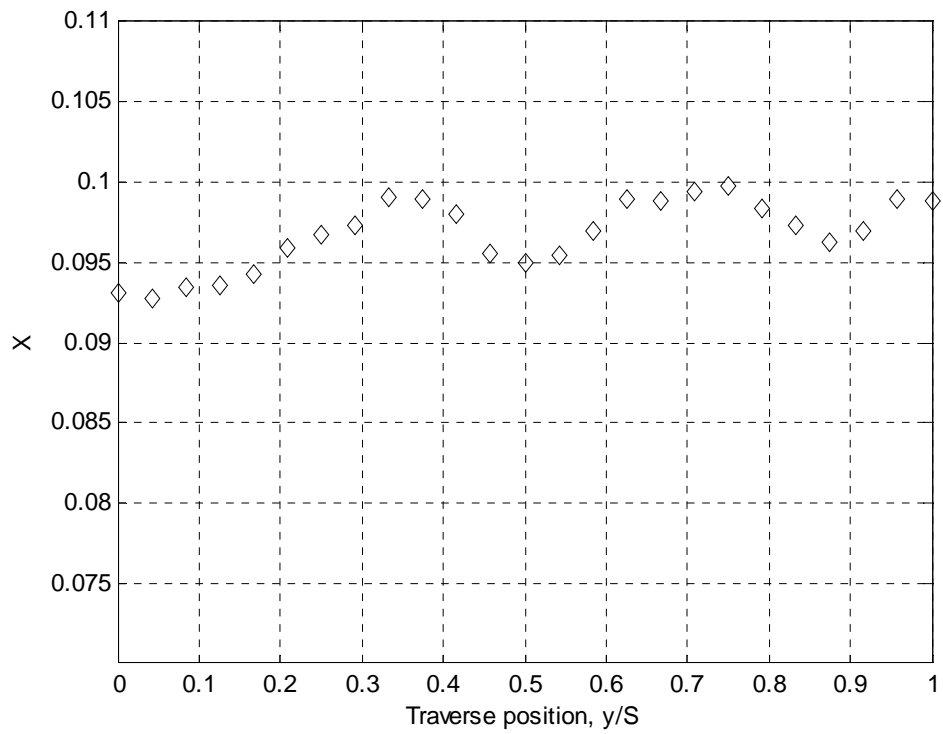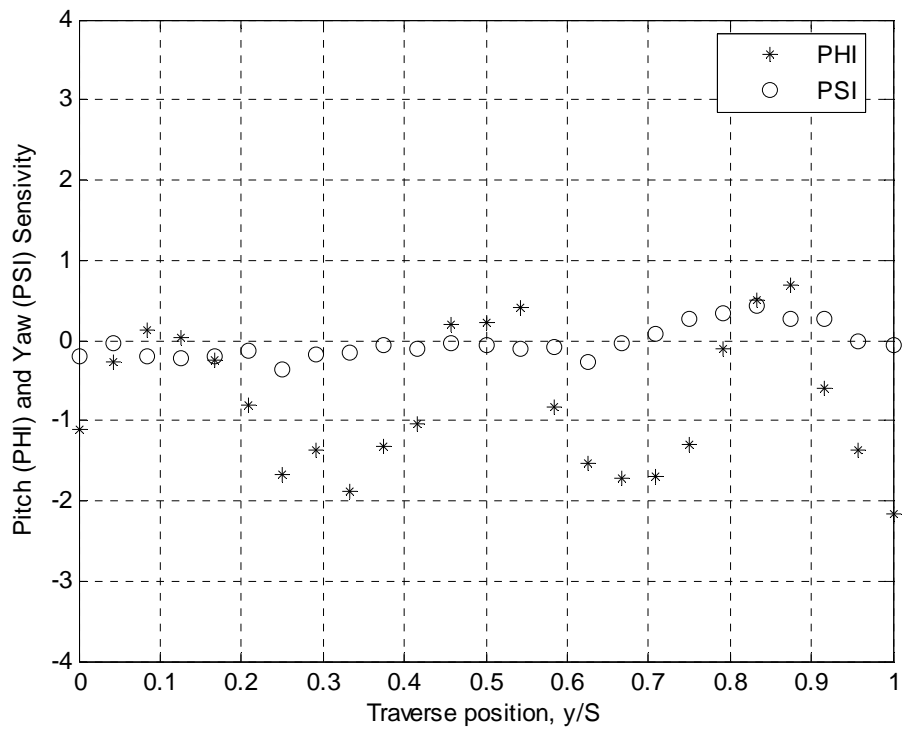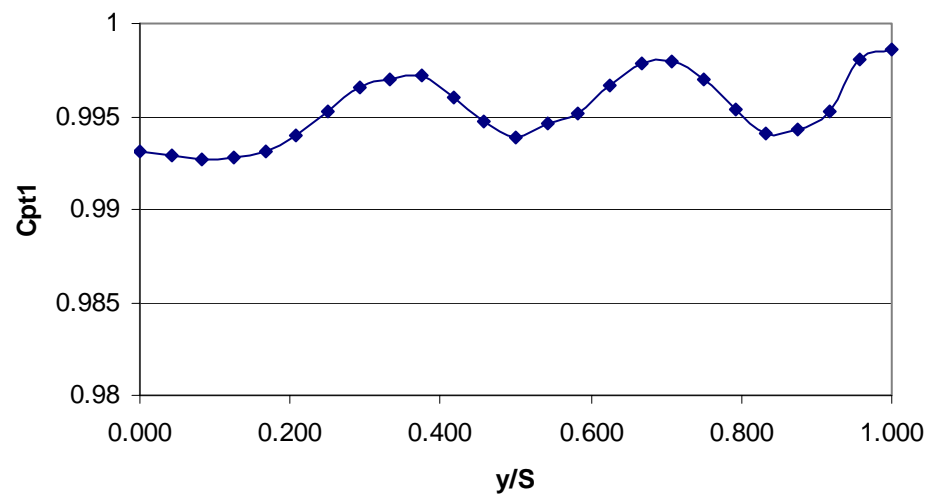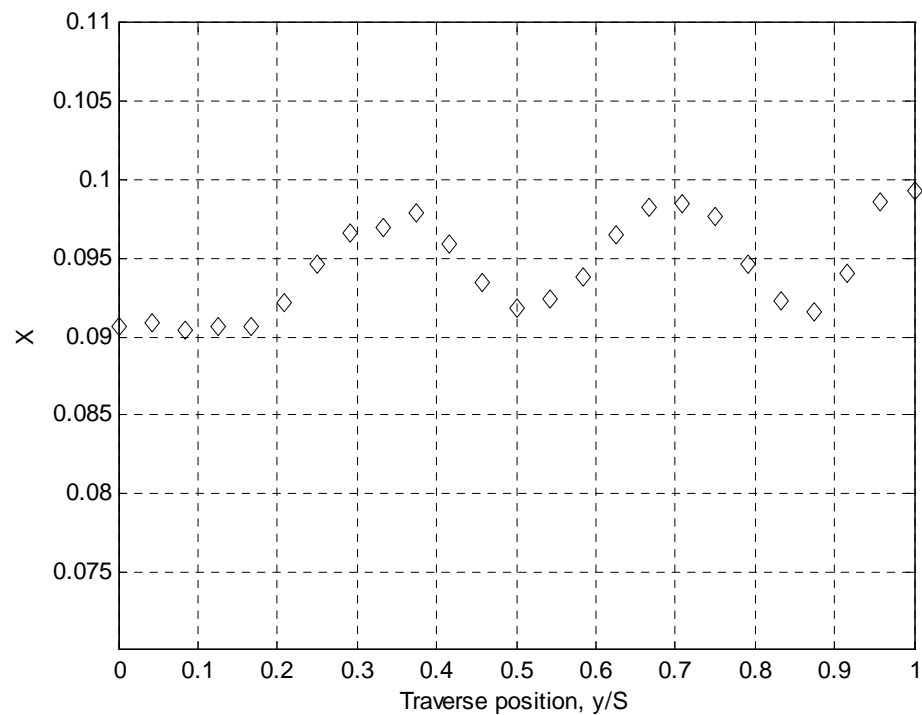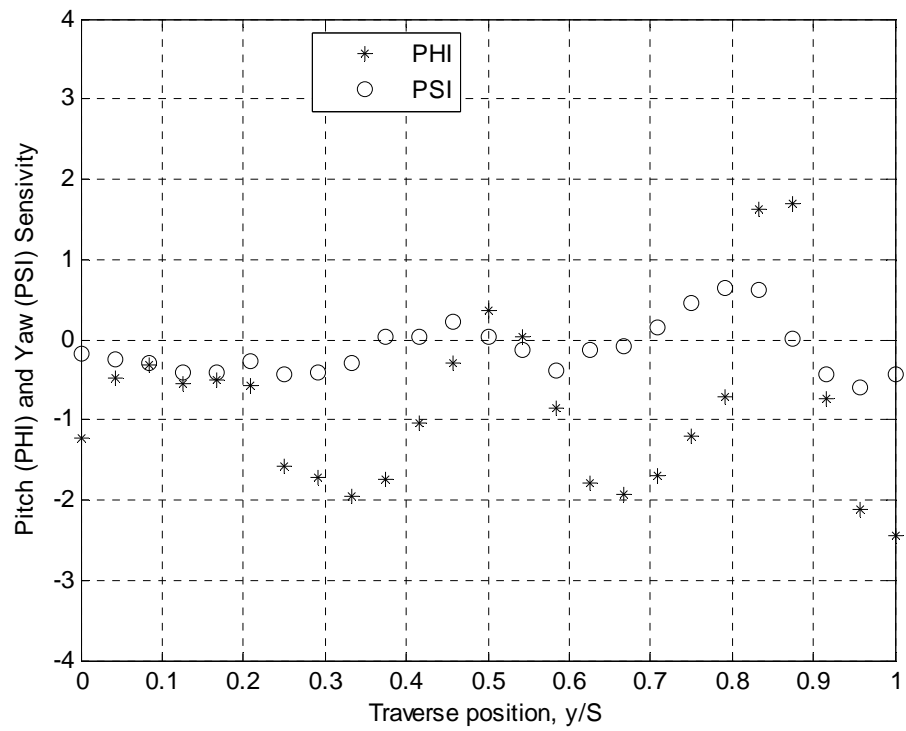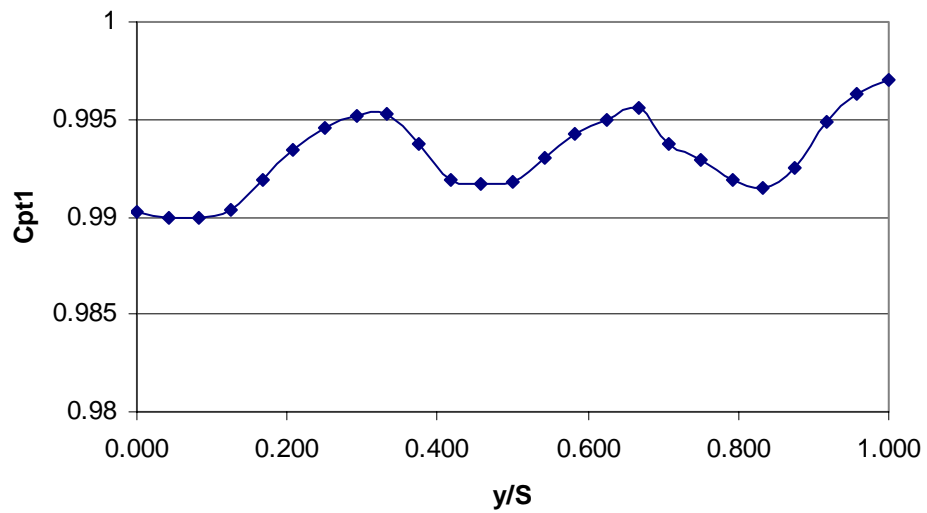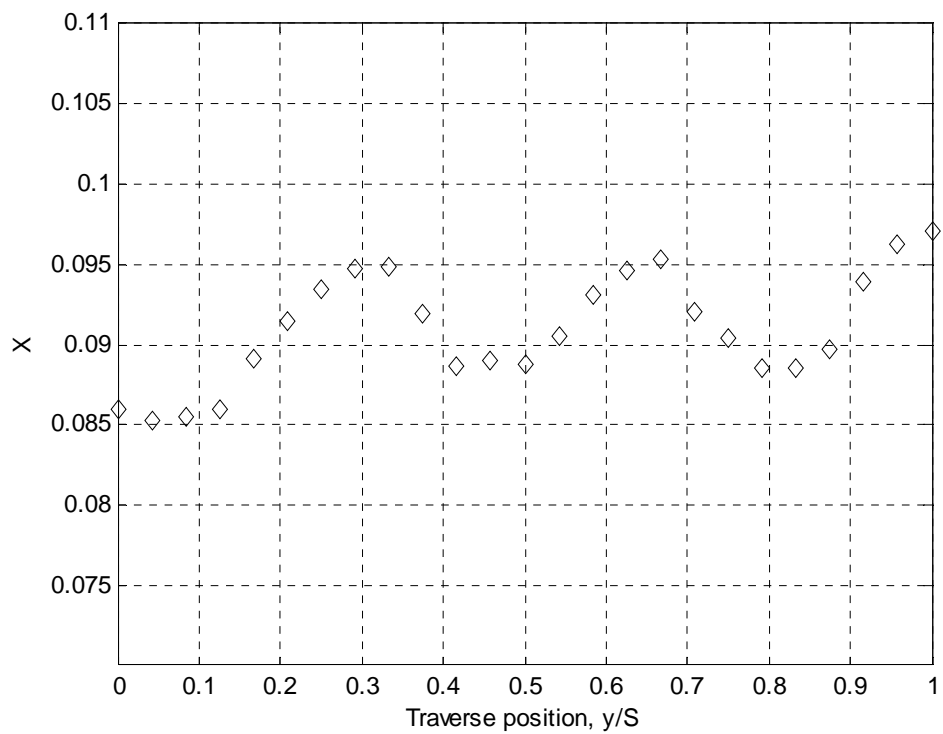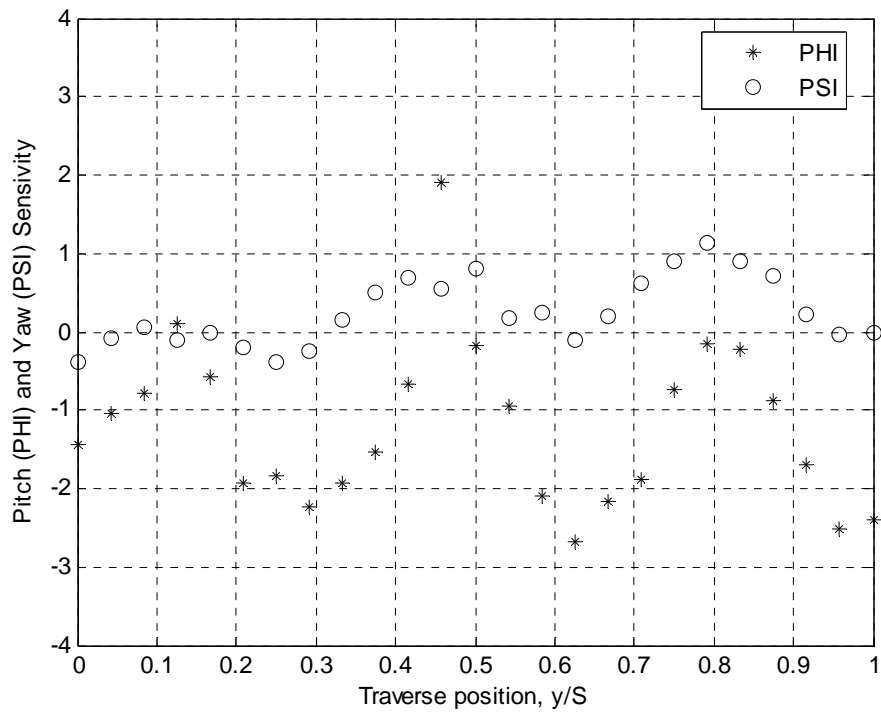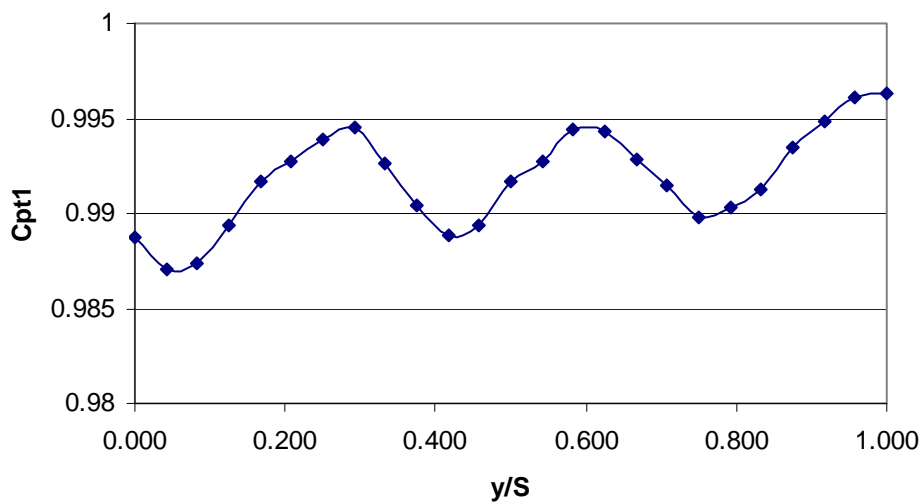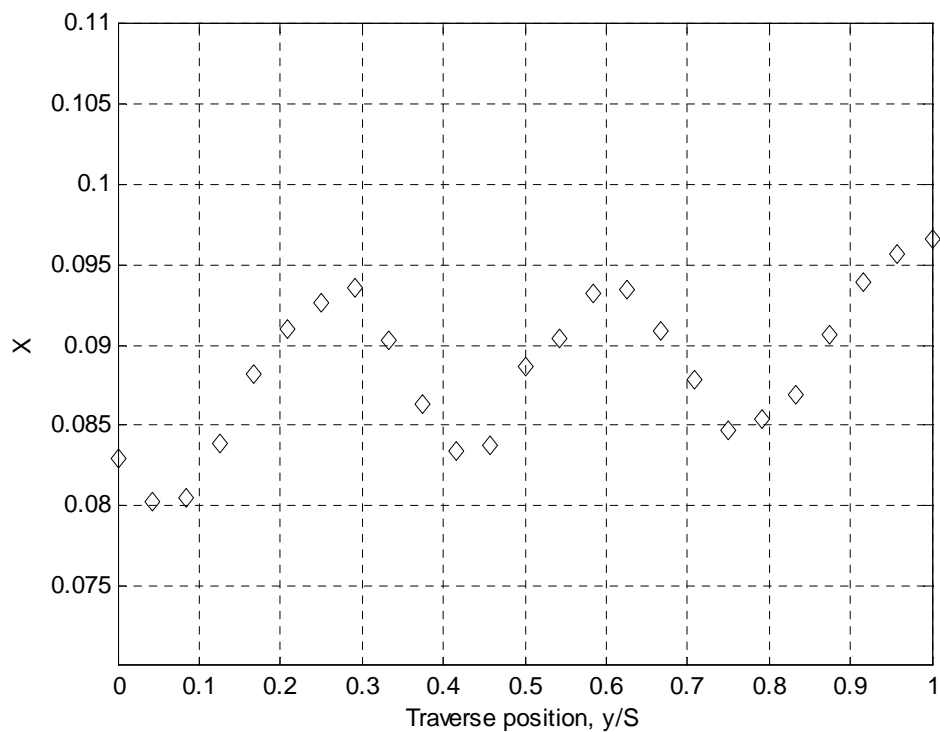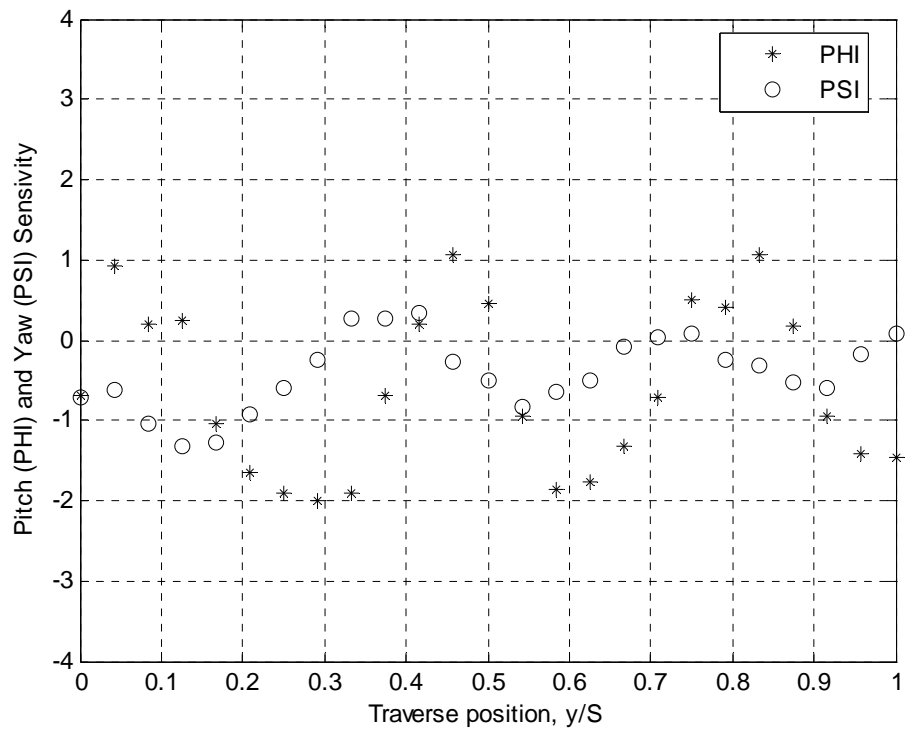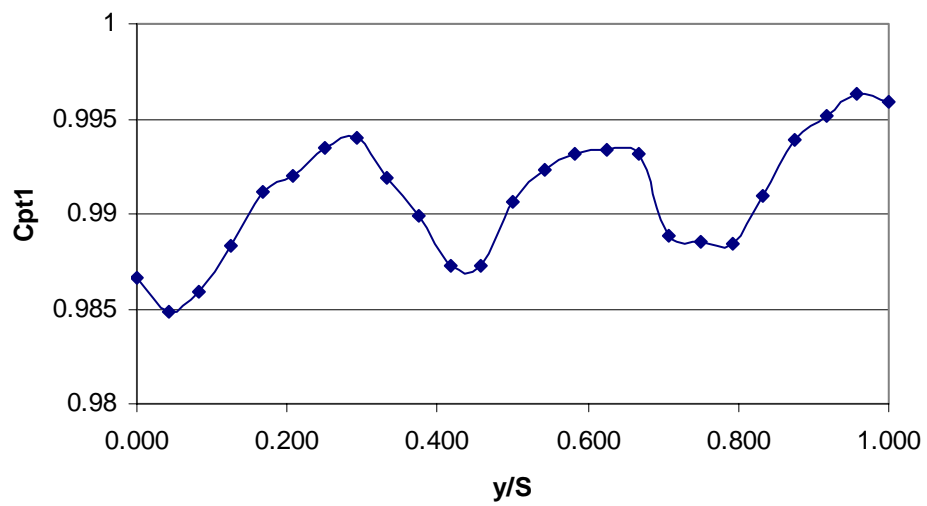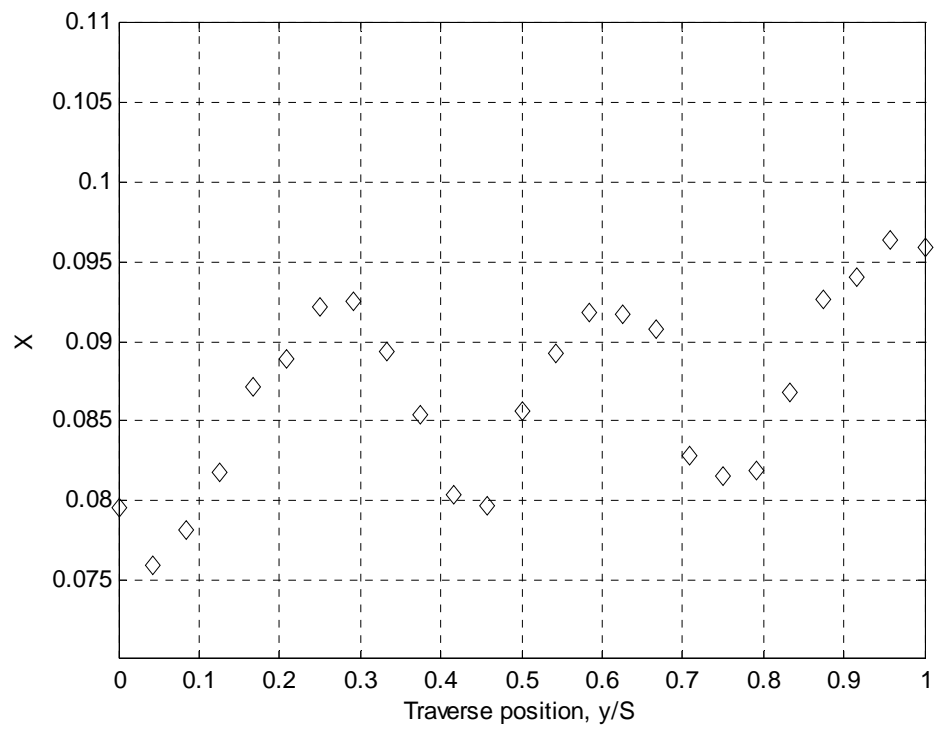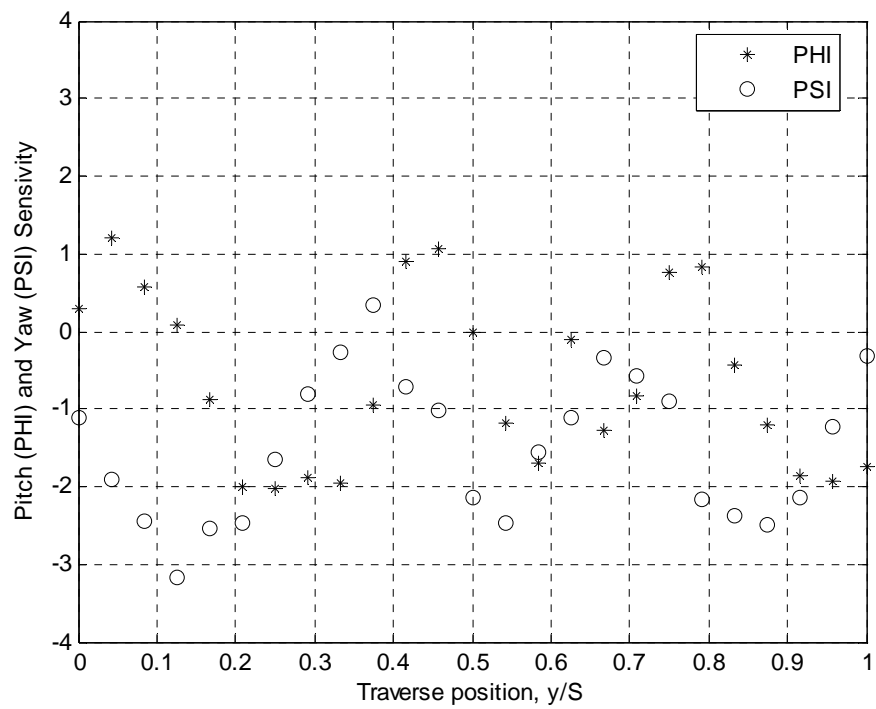| y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.994	0.966	103200.6	99924.6	99930.2	100063.0	99827.2	100589.1	0.032	0.072	-0.002	0.093	-0.258	0.462
0.042	0.994	0.966	103163.0	99926.7	99929.7	100109.4	99790.5	100583.9	0.031	0.099	-0.001	0.092	-1.201	0.466
0.083	0.994	0.966	103141.2	99936.8	99932.8	100066.6	99843.9	100584.2	0.031	0.070	0.001	0.092	-0.171	0.370
0.125	0.993	0.966	103101.2	99929.6	99929.3	100070.4	99851.6	100576.4	0.031	0.069	0.000	0.091	-0.136	0.401
0.167	0.994	0.966	103141.7	99963.1	99964.7	100086.3	99895.5	100610.3	0.031	0.060	-0.001	0.092	0.196	0.405
0.208	0.994	0.966	103216.0	99969.5	99943.1	100095.6	99842.3	100613.3	0.032	0.078	0.008	0.093	-0.545	0.179
0.250	0.995	0.966	103292.7	99964.6	99937.9	100076.8	99890.7	100632.6	0.032	0.056	0.008	0.094	0.238	0.151
0.292	0.995	0.966	103252.7	99893.4	99863.5	100011.8	99774.2	100559.1	0.033	0.071	0.009	0.095	-0.317	0.151
0.333	0.995	0.966	103241.0	99959.4	99965.5	100038.3	99935.9	100628.0	0.032	0.031	-0.002	0.093	1.260	0.387
0.375	0.994	0.965	103117.7	99928.1	99880.1	100073.1	99781.3	100556.1	0.031	0.091	0.015	0.092	-1.059	-0.015
0.417	0.994	0.965	103144.4	99976.9	99912.7	100100.6	99789.4	100584.8	0.031	0.097	0.020	0.092	-1.314	-0.162
0.458	0.994	0.966	103170.3	99980.3	99962.2	100041.0	99924.4	100615.6	0.031	0.037	0.006	0.092	1.023	0.176
0.500	0.995	0.966	103227.9	99965.5	99905.6	100110.7	99814.9	100604.9	0.032	0.090	0.018	0.093	-1.082	-0.110
0.542	0.995	0.965	103279.1	99958.8	99888.8	100088.2	99778.7	100598.7	0.032	0.092	0.021	0.094	-1.201	-0.183
0.583	0.994	0.965	103242.0	99927.1	99871.2	100068.0	99768.6	100575.4	0.032	0.090	0.017	0.094	-1.070	-0.064
0.625	0.995	0.965	103232.9	99954.7	99897.2	100112.8	99765.1	100592.5	0.032	0.105	0.017	0.094	-1.601	-0.077
0.667	0.994	0.966	103194.2	99981.4	99923.5	100140.5	99789.8	100605.9	0.031	0.108	0.018	0.093	-1.686	-0.093
0.708	0.994	0.966	103202.0	99973.3	99905.5	100139.7	99780.2	100600.1	0.032	0.111	0.021	0.093	-1.788	-0.180
0.750	0.995	0.966	103246.2	99976.5	99907.3	100172.5	99766.8	100613.9	0.032	0.123	0.021	0.093	-2.221	-0.185
0.792	0.995	0.965	103274.8	99928.4	99848.2	100050.2	99804.3	100581.2	0.033	0.073	0.024	0.095	-0.545	-0.283
0.833	0.996	0.965	103320.5	100272.3	99881.6	100102.9	99762.9	100668.0	0.032	0.103	0.118	0.093	-2.377	-2.894
0.875	0.996	0.965	103346.0	100198.4	99852.0	100049.8	99700.2	100629.3	0.033	0.103	0.102	0.094	-2.292	-2.468
0.917	0.996	0.965	103384.7	100230.1	99922.1	100121.2	99817.1	100695.0	0.033	0.090	0.092	0.094	-1.785	-2.188
0.958	0.996	0.965	103384.1	100183.2	99870.0	100041.1	99705.6	100636.8	0.033	0.098	0.091	0.095	-2.041	-2.171
1.000	0.996	0.965	103378.7	99981.3	99839.0	100097.8	99652.3	100589.8	0.034	0.128	0.041	0.096	-2.571	-0.767

Survey Location 3

y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.994	0.966	103291.2	100104.8	100112.7	100229.0	100093.0	100766.1	0.031	0.043	-0.003	0.091	0.853	0.430
0.042	0.994	0.966	103318.9	100115.3	100134.7	100236.8	100081.6	100777.4	0.031	0.049	-0.006	0.092	0.663	0.549
0.083	0.994	0.966	103295.6	100096.1	100112.5	100246.2	100077.5	100765.6	0.031	0.053	-0.005	0.092	0.493	0.530
0.125	0.994	0.966	103364.8	100079.2	100091.1	100229.2	100042.9	100761.5	0.031	0.057	-0.004	0.093	0.311	0.495
0.167	0.995	0.966	103382.6	100087.2	100098.2	100242.9	100052.1	100772.6	0.032	0.059	-0.003	0.093	0.260	0.489
0.208	0.995	0.966	103432.1	100080.0	100090.6	100232.9	99966.0	100760.3	0.032	0.080	-0.003	0.094	-0.540	0.516
0.250	0.996	0.966	103519.4	100078.2	100092.1	100246.6	100005.8	100788.4	0.033	0.071	-0.004	0.095	-0.210	0.530
0.292	0.996	0.966	103578.1	100067.1	100095.6	100270.9	99973.1	100797.0	0.034	0.086	-0.008	0.096	-0.731	0.672
0.333	0.996	0.966	103571.3	100071.1	100075.1	100250.3	99892.9	100772.2	0.034	0.102	-0.001	0.097	-1.377	0.478
0.375	0.997	0.966	103550.5	100126.1	100093.5	100273.3	99934.9	100795.7	0.033	0.098	0.009	0.096	-1.325	0.159
0.417	0.996	0.966	103563.3	100106.5	100082.8	100277.8	99940.9	100794.2	0.033	0.097	0.007	0.096	-1.272	0.236
0.458	0.997	0.965	103642.6	100097.6	100064.4	100243.3	99935.1	100796.6	0.034	0.087	0.009	0.097	-0.933	0.155
0.500	0.997	0.966	103670.6	100108.4	100077.1	100238.9	99918.4	100802.7	0.035	0.089	0.009	0.098	-1.029	0.175
0.542	0.997	0.966	103646.5	100129.2	100107.2	100246.0	99995.0	100824.8	0.034	0.071	0.006	0.097	-0.346	0.229
0.583	0.997	0.966	103623.8	100126.2	100112.1	100267.0	99933.8	100812.6	0.034	0.095	0.004	0.097	-1.168	0.319
0.625	0.996	0.966	103528.6	100095.8	100083.5	100256.3	99955.6	100783.9	0.033	0.088	0.004	0.096	-0.897	0.325
0.667	0.996	0.966	103502.4	100099.8	100089.0	100260.8	99943.6	100779.1	0.033	0.093	0.003	0.095	-1.084	0.342
0.708	0.996	0.966	103482.1	100129.8	100108.0	100299.2	99929.3	100789.7	0.033	0.110	0.006	0.095	-1.680	0.254
0.750	0.996	0.965	103514.8	100106.9	100088.2	100263.9	99923.5	100779.3	0.033	0.099	0.005	0.095	-1.323	0.278
0.792	0.997	0.966	103617.0	100137.1	100098.4	100269.0	99935.3	100811.4	0.034	0.095	0.011	0.097	-1.241	0.112
0.833	0.997	0.965	103692.1	100101.6	100067.6	100230.8	99948.3	100808.1	0.035	0.078	0.009	0.098	-0.644	0.144
0.875	0.998	0.966	103776.9	100129.5	100105.8	100250.2	99971.4	100846.8	0.035	0.076	0.006	0.099	-0.542	0.227
0.917	0.998	0.966	103739.4	100113.5	100090.8	100229.8	99993.1	100833.3	0.035	0.065	0.006	0.099	-0.140	0.218
0.958	0.998	0.966	103724.3	100102.4	100092.5	100261.0	99964.6	100829.0	0.035	0.082	0.003	0.098	-0.712	0.343
1.000	0.997	0.966	103663.3	100124.7	100118.3	100274.2	99954.3	100827.0	0.034	0.090	0.002	0.097	-0.991	0.380

Survey Location 5

y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.994	0.966	103879.8	100644.4	100577.2	100722.5	100562.8	101277.3	0.031	0.049	0.021	0.093	0.409	-0.232
0.042	0.995	0.966	103939.9	100624.9	100570.1	100712.5	100559.7	101281.4	0.032	0.046	0.016	0.094	0.545	-0.114
0.083	0.996	0.966	104004.1	100644.6	100578.4	100706.1	100567.9	101300.2	0.032	0.041	0.020	0.094	0.696	-0.212
0.125	0.996	0.966	104031.4	100607.1	100551.1	100695.0	100550.9	101287.1	0.033	0.042	0.016	0.095	0.671	-0.114
0.167	0.997	0.966	104108.9	100617.8	100593.8	100721.4	100574.5	101323.3	0.033	0.042	0.007	0.096	0.733	0.159
0.208	0.997	0.966	104122.3	100617.6	100610.5	100732.1	100467.8	101310.0	0.034	0.075	0.002	0.097	-0.450	0.357
0.250	0.997	0.966	104121.0	100601.2	100600.8	100688.5	100578.1	101311.0	0.034	0.032	0.000	0.096	1.189	0.332
0.292	0.997	0.966	104150.2	100599.8	100572.4	100694.9	100537.7	101311.0	0.034	0.044	0.008	0.097	0.635	0.141
0.333	0.997	0.965	104165.0	100530.9	100511.7	100651.5	100463.0	101264.4	0.035	0.052	0.005	0.098	0.356	0.225
0.375	0.997	0.965	104137.8	100527.3	100512.5	100703.6	100303.4	101236.9	0.035	0.110	0.004	0.098	-1.716	0.327
0.417	0.997	0.965	104193.2	100524.8	100519.4	100703.3	100328.0	101253.8	0.035	0.102	0.001	0.099	-1.414	0.399
0.458	0.998	0.966	104265.6	100606.7	100618.5	100756.1	100475.4	101344.5	0.035	0.077	-0.003	0.099	-0.480	0.511
0.500	0.999	0.965	104328.6	100505.7	100516.7	100551.2	100470.9	101274.6	0.037	0.021	-0.003	0.101	1.538	0.379
0.542	0.999	0.966	104338.5	100560.8	100592.5	100689.1	100410.3	101318.3	0.036	0.074	-0.008	0.100	-0.337	0.650
0.583	0.999	0.966	104357.6	100584.9	100621.2	100735.8	100461.8	101352.3	0.036	0.073	-0.010	0.100	-0.292	0.686
0.625	0.998	0.966	104239.4	100579.5	100630.0	100732.0	100407.3	101317.6	0.035	0.089	-0.014	0.099	-0.819	0.838
0.667	0.998	0.966	104212.0	100556.4	100614.0	100743.4	100386.2	101302.4	0.035	0.098	-0.016	0.098	-1.131	0.911
0.708	0.998	0.966	104195.4	100558.2	100577.8	100736.1	100411.7	101295.8	0.035	0.090	-0.005	0.098	-0.910	0.591
0.750	0.997	0.965	104188.4	100567.3	100592.0	100780.7	100340.6	101293.8	0.035	0.122	-0.007	0.098	-2.011	0.664
0.792	0.998	0.966	104189.5	100596.7	100603.8	100779.2	100431.5	101320.2	0.034	0.097	-0.002	0.098	-1.197	0.498
0.833	0.998	0.966	104265.9	100620.6	100628.1	100760.1	100485.0	101351.9	0.035	0.076	-0.002	0.098	-0.442	0.475
0.875	0.999	0.966	104371.2	100629.0	100633.3	100761.7	100548.5	101388.7	0.036	0.057	-0.001	0.100	0.208	0.416
0.917	0.999	0.966	104378.5	100625.7	100662.1	100768.1	100528.5	101392.6	0.036	0.064	-0.010	0.100	0.025	0.676
0.958	0.999	0.966	104358.2	100623.6	100643.7	100775.2	100459.2	101372.0	0.036	0.085	-0.005	0.100	-0.745	0.581
1.000	0.998	0.966	104275.1	100639.1	100669.2	100815.3	100477.1	101375.2	0.035	0.093	-0.008	0.098	-1.019	0.681

Survey Location 7

y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.995	0.966	102984.1	99758.4	99696.6	99884.2	99657.0	100396.1	0.031	0.070	0.019	0.093	-0.364	-0.154
0.042	0.995	0.966	103067.2	99753.6	99671.1	99875.5	99651.1	100403.7	0.032	0.067	0.025	0.094	-0.341	-0.318
0.083	0.996	0.966	103084.0	99767.2	99697.8	99860.4	99675.9	100417.1	0.032	0.055	0.021	0.094	0.143	-0.221
0.125	0.996	0.966	103111.4	99761.5	99704.0	99857.1	99682.2	100423.2	0.033	0.052	0.017	0.095	0.293	-0.118
0.167	0.996	0.966	103141.5	99763.6	99711.8	99872.6	99678.9	100433.7	0.033	0.057	0.015	0.095	0.109	-0.056
0.208	0.997	0.966	103189.3	99752.6	99696.1	99879.6	99596.2	100422.8	0.034	0.082	0.016	0.096	-0.818	-0.054
0.250	0.997	0.966	103229.8	99765.5	99679.1	99913.2	99613.8	100440.3	0.034	0.086	0.025	0.096	-1.039	-0.297
0.292	0.997	0.966	103287.6	99756.3	99661.5	99924.4	99525.6	100431.1	0.035	0.112	0.027	0.098	-1.947	-0.338
0.333	0.998	0.966	103318.7	99754.2	99665.0	99938.0	99550.7	100445.3	0.035	0.108	0.025	0.098	-1.806	-0.288
0.375	0.998	0.966	103359.1	99746.2	99660.9	99925.3	99557.5	100449.7	0.035	0.101	0.023	0.099	-1.567	-0.248
0.417	0.998	0.966	103396.7	99736.6	99682.7	99897.5	99597.7	100462.2	0.035	0.082	0.015	0.099	-0.817	-0.006
0.458	0.999	0.966	103424.8	99701.6	99690.6	99862.6	99631.3	100462.2	0.036	0.062	0.003	0.100	-0.021	0.306
0.500	0.998	0.966	103388.6	99705.5	99705.5	99867.0	99663.3	100466.0	0.035	0.056	0.000	0.099	0.255	0.382
0.542	0.998	0.966	103339.0	99708.6	99717.7	99863.8	99648.2	100455.5	0.035	0.060	-0.003	0.098	0.134	0.464
0.583	0.998	0.966	103341.2	99737.3	99706.1	99887.0	99607.4	100455.8	0.035	0.078	0.009	0.098	-0.609	0.165
0.625	0.998	0.966	103359.9	99744.1	99699.6	99930.4	99532.7	100453.3	0.035	0.109	0.012	0.099	-1.755	0.084
0.667	0.998	0.966	103365.5	99755.2	99698.7	99951.2	99533.0	100460.7	0.035	0.115	0.016	0.099	-1.974	-0.011
0.708	0.999	0.966	103400.3	99758.2	99693.0	99954.9	99540.5	100469.4	0.035	0.113	0.018	0.099	-1.923	-0.077
0.750	0.998	0.966	103391.9	99754.5	99689.2	99934.0	99551.4	100464.2	0.035	0.105	0.018	0.099	-1.637	-0.082
0.792	0.999	0.966	103457.4	99721.1	99695.6	99884.2	99581.5	100468.0	0.036	0.081	0.007	0.100	-0.722	0.220
0.833	0.999	0.966	103494.7	99705.9	99697.4	99851.3	99632.9	100476.4	0.036	0.058	0.002	0.101	0.146	0.316
0.875	0.999	0.966	103502.6	99685.6	99728.0	99849.1	99656.7	100484.4	0.036	0.051	-0.011	0.101	0.508	0.689
0.917	0.999	0.966	103453.1	99692.1	99725.5	99868.3	99611.5	100470.1	0.036	0.069	-0.009	0.100	-0.152	0.660
0.958	0.999	0.966	103424.2	99719.7	99731.7	99900.2	99589.7	100473.1	0.036	0.084	-0.003	0.100	-0.745	0.518
1.000	0.998	0.966	103402.2	99733.9	99704.4	99935.5	99550.4	100465.3	0.036	0.105	0.008	0.099	-1.564	0.207

Survey Location 9

y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.994	0.966	103854.5	100609.3	100540.3	100695.7	100398.8	101219.7	0.032	0.090	0.021	0.093	-1.101	-0.189
0.042	0.994	0.966	103861.7	100622.9	100573.1	100705.0	100481.4	101248.9	0.031	0.068	0.015	0.093	-0.265	-0.043
0.083	0.994	0.965	103900.3	100618.3	100552.4	100680.6	100493.6	101249.1	0.032	0.056	0.020	0.093	0.123	-0.193
0.125	0.994	0.965	103904.4	100621.4	100551.4	100678.0	100484.7	101248.0	0.032	0.058	0.021	0.094	0.043	-0.226
0.167	0.995	0.966	103956.4	100621.5	100552.0	100699.5	100479.0	101261.7	0.032	0.065	0.021	0.094	-0.234	-0.200
0.208	0.996	0.965	104050.0	100617.0	100552.0	100706.0	100424.8	101270.0	0.033	0.081	0.019	0.096	-0.800	-0.124
0.250	0.997	0.966	104117.6	100640.5	100545.0	100746.0	100378.3	101285.5	0.034	0.104	0.027	0.097	-1.684	-0.353
0.292	0.997	0.966	104166.0	100630.0	100555.4	100763.4	100419.4	101306.8	0.034	0.096	0.021	0.097	-1.373	-0.176
0.333	0.998	0.966	104266.4	100616.5	100542.7	100764.5	100351.5	101308.3	0.035	0.112	0.020	0.099	-1.894	-0.141
0.375	0.998	0.966	104254.6	100606.9	100544.0	100736.9	100383.8	101305.3	0.035	0.096	0.017	0.099	-1.330	-0.063
0.417	0.997	0.965	104185.2	100609.9	100544.9	100709.8	100392.8	101299.1	0.035	0.088	0.018	0.098	-1.048	-0.096
0.458	0.996	0.966	104054.9	100627.1	100578.0	100700.0	100510.8	101294.2	0.033	0.055	0.014	0.096	0.201	-0.028
0.500	0.996	0.966	104011.6	100626.7	100574.9	100683.1	100498.3	101278.9	0.033	0.054	0.015	0.095	0.227	-0.057
0.542	0.996	0.966	104044.8	100627.6	100570.0	100684.7	100515.9	101288.6	0.033	0.049	0.017	0.095	0.398	-0.111
0.583	0.997	0.965	104136.9	100630.2	100567.9	100724.9	100435.9	101309.8	0.034	0.081	0.018	0.097	-0.822	-0.089
0.625	0.998	0.965	104261.7	100614.9	100524.3	100755.9	100386.8	101308.7	0.035	0.100	0.025	0.099	-1.540	-0.280
0.667	0.998	0.966	104274.7	100620.3	100559.5	100801.4	100406.9	101332.6	0.035	0.107	0.017	0.099	-1.717	-0.043
0.708	0.998	0.966	104311.9	100613.6	100568.7	100788.2	100386.6	101333.8	0.036	0.108	0.012	0.100	-1.699	0.090
0.750	0.998	0.966	104322.4	100585.4	100563.9	100762.8	100397.4	101326.4	0.036	0.098	0.006	0.100	-1.293	0.269
0.792	0.998	0.966	104239.4	100603.4	100594.9	100715.0	100477.2	101326.0	0.035	0.065	0.002	0.097	-0.110	0.333
0.833	0.997	0.966	104178.7	100601.4	100607.5	100706.0	100529.0	101324.5	0.034	0.050	-0.002	0.097	0.514	0.424
0.875	0.996	0.966	104113.4	100615.4	100605.0	100693.0	100539.5	101313.3	0.034	0.044	0.003	0.096	0.702	0.278
0.917	0.997	0.966	104144.1	100622.8	100604.3	100728.2	100449.8	101309.8	0.034	0.079	0.005	0.097	-0.604	0.268
0.958	0.998	0.965	104269.7	100625.8	100570.5	100754.9	100395.6	101323.3	0.035	0.098	0.015	0.099	-1.372	-0.003
1.000	0.998	0.966	104263.8	100630.1	100568.0	100795.7	100351.7	101321.8	0.035	0.121	0.017	0.099	-2.168	-0.050

Survey Location 11

y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.993	0.966	102831.1	99736.9	99673.1	99895.3	99597.0	100346.7	0.030	0.096	0.021	0.091	-1.239	-0.181
0.042	0.993	0.966	102845.5	99730.9	99661.8	99867.8	99638.1	100348.8	0.030	0.074	0.022	0.091	-0.473	-0.244
0.083	0.993	0.966	102825.9	99739.9	99666.8	99865.7	99651.3	100349.9	0.030	0.069	0.024	0.090	-0.320	-0.293
0.125	0.993	0.966	102821.2	99728.3	99642.5	99854.4	99622.5	100333.8	0.030	0.075	0.028	0.091	-0.552	-0.402
0.167	0.993	0.966	102844.7	99752.6	99666.7	99873.1	99645.8	100356.6	0.030	0.073	0.028	0.091	-0.498	-0.405
0.208	0.994	0.966	102929.4	99731.7	99656.4	99879.1	99637.2	100366.8	0.031	0.076	0.024	0.092	-0.585	-0.278
0.250	0.995	0.966	103072.8	99724.9	99625.4	99902.3	99561.4	100377.4	0.033	0.101	0.030	0.095	-1.588	-0.433
0.292	0.997	0.966	103190.4	99709.4	99608.4	99911.3	99546.5	100393.2	0.034	0.104	0.029	0.097	-1.717	-0.410
0.333	0.997	0.966	103227.3	99707.3	99619.5	99939.5	99544.1	100407.5	0.034	0.112	0.025	0.097	-1.945	-0.292
0.375	0.997	0.966	103258.0	99668.2	99618.0	99909.8	99521.7	100395.1	0.035	0.108	0.014	0.098	-1.734	0.031
0.417	0.996	0.966	103150.8	99694.6	99648.7	99893.9	99586.1	100394.8	0.033	0.089	0.013	0.096	-1.050	0.039
0.458	0.995	0.966	103005.1	99693.7	99672.0	99879.4	99646.3	100379.3	0.032	0.071	0.007	0.094	-0.294	0.216
0.500	0.994	0.966	102921.2	99731.2	99693.5	99864.7	99696.3	100381.4	0.031	0.053	0.012	0.092	0.353	0.030
0.542	0.995	0.966	102965.6	99745.2	99688.3	99869.3	99676.5	100389.0	0.031	0.060	0.018	0.092	0.034	-0.126
0.583	0.995	0.966	103041.3	99730.6	99638.0	99902.9	99635.7	100389.7	0.032	0.081	0.028	0.094	-0.844	-0.397
0.625	0.997	0.966	103202.0	99731.1	99664.0	99925.7	99545.5	100413.7	0.034	0.109	0.019	0.096	-1.788	-0.126
0.667	0.998	0.966	103319.2	99713.9	99649.1	99948.2	99538.9	100433.9	0.035	0.113	0.018	0.098	-1.937	-0.085
0.708	0.998	0.966	103332.2	99695.6	99658.5	99938.3	99545.9	100434.1	0.035	0.108	0.010	0.099	-1.699	0.143
0.750	0.997	0.966	103265.9	99673.4	99675.7	99909.9	99566.4	100418.2	0.034	0.097	-0.001	0.098	-1.194	0.458
0.792	0.995	0.966	103110.1	99716.1	99741.2	99925.2	99637.3	100426.0	0.033	0.086	-0.007	0.095	-0.719	0.651
0.833	0.994	0.966	102929.6	99690.2	99722.9	99795.5	99719.9	100371.6	0.031	0.024	-0.010	0.092	1.626	0.611
0.875	0.994	0.967	102962.4	99796.0	99764.5	99835.2	99777.6	100427.2	0.031	0.018	0.010	0.092	1.697	0.002
0.917	0.995	0.966	103066.6	99754.1	99657.7	99893.8	99637.4	100401.9	0.032	0.077	0.029	0.094	-0.728	-0.429
0.958	0.998	0.966	103353.6	99758.1	99630.3	99947.9	99530.0	100444.0	0.035	0.115	0.035	0.099	-2.127	-0.586
1.000	0.999	0.966	103407.4	99767.8	99657.2	99974.8	99509.3	100463.3	0.036	0.126	0.030	0.099	-2.456	-0.438

Survey Location 13

y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.990	0.966	102534.9	99740.6	99664.0	99879.4	99583.9	100280.5	0.027	0.105	0.027	0.086	-1.427	-0.383
0.042	0.990	0.966	102495.0	99735.6	99689.3	99862.2	99595.7	100275.5	0.027	0.096	0.017	0.085	-1.033	-0.079
0.083	0.990	0.966	102512.4	99738.9	99705.7	99849.7	99601.1	100281.6	0.027	0.089	0.012	0.086	-0.774	0.057
0.125	0.990	0.966	102550.6	99737.2	99691.5	99846.5	99669.7	100299.1	0.027	0.063	0.016	0.086	0.097	-0.106
0.167	0.992	0.966	102728.0	99727.9	99683.9	99854.4	99615.4	100321.9	0.029	0.079	0.015	0.089	-0.569	-0.022
0.208	0.993	0.966	102866.7	99742.2	99673.5	99883.3	99516.0	100336.4	0.031	0.116	0.022	0.092	-1.940	-0.208
0.250	0.995	0.966	102976.3	99718.6	99628.4	99883.9	99523.2	100346.1	0.032	0.110	0.027	0.093	-1.832	-0.375
0.292	0.995	0.966	103050.9	99703.1	99624.4	99899.8	99487.8	100353.2	0.033	0.122	0.023	0.095	-2.231	-0.251
0.333	0.995	0.966	103059.5	99676.5	99643.8	99903.6	99511.6	100353.0	0.033	0.116	0.010	0.095	-1.923	0.158
0.375	0.994	0.966	102890.7	99672.9	99678.3	99903.1	99555.7	100340.1	0.031	0.109	-0.002	0.092	-1.531	0.496
0.417	0.992	0.966	102722.7	99707.6	99733.9	99899.0	99637.1	100340.0	0.029	0.088	-0.009	0.089	-0.664	0.687
0.458	0.992	0.966	102684.9	99654.8	99681.2	99742.8	99690.9	100290.9	0.029	0.017	-0.009	0.089	1.898	0.543
0.500	0.992	0.966	102708.5	99697.0	99736.8	99858.5	99635.3	100327.2	0.029	0.075	-0.013	0.089	-0.172	0.805
0.542	0.993	0.966	102812.2	99710.2	99683.1	99876.5	99597.0	100335.8	0.030	0.090	0.009	0.091	-0.937	0.167
0.583	0.994	0.966	102963.1	99700.7	99677.1	99900.5	99498.0	100347.9	0.032	0.123	0.007	0.093	-2.105	0.234
0.625	0.995	0.966	103047.7	99694.7	99633.7	99922.1	99459.3	100351.5	0.033	0.137	0.018	0.095	-2.675	-0.095
0.667	0.996	0.966	103104.7	99682.2	99654.6	99931.0	99509.5	100376.4	0.033	0.124	0.008	0.095	-2.167	0.209
0.708	0.994	0.966	102911.2	99688.0	99706.6	99919.0	99534.5	100351.9	0.031	0.120	-0.006	0.092	-1.884	0.630
0.750	0.993	0.966	102824.4	99692.6	99742.1	99896.0	99615.8	100354.2	0.030	0.091	-0.016	0.091	-0.747	0.912
0.792	0.992	0.966	102706.8	99682.5	99755.4	99877.4	99649.1	100334.2	0.029	0.077	-0.025	0.089	-0.151	1.145
0.833	0.992	0.966	102694.3	99682.7	99730.5	99862.8	99634.7	100321.0	0.029	0.077	-0.016	0.089	-0.214	0.890
0.875	0.992	0.966	102779.9	99713.0	99741.5	99885.4	99601.5	100344.3	0.030	0.093	-0.009	0.090	-0.872	0.711
0.917	0.995	0.966	103034.3	99714.1	99688.9	99914.9	99548.8	100380.2	0.032	0.110	0.008	0.094	-1.695	0.219
0.958	0.996	0.966	103180.1	99720.8	99664.8	99941.6	99483.4	100398.1	0.034	0.132	0.016	0.096	-2.507	-0.032
1.000	0.997	0.966	103235.1	99702.9	99649.2	99954.9	99501.5	100408.7	0.034	0.128	0.015	0.097	-2.397	-0.003

Survey Location 15

y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.989	0.966	103084.7	100461.0	100361.2	100561.1	100338.7	100961.3	0.026	0.084	0.038	0.083	-0.682	-0.716
0.042	0.987	0.966	102942.9	100462.6	100385.7	100547.6	100444.4	100956.7	0.024	0.042	0.031	0.080	0.913	-0.619
0.083	0.987	0.966	102949.0	100488.9	100371.8	100538.9	100390.7	100947.9	0.024	0.059	0.047	0.080	0.192	-1.038
0.125	0.989	0.966	103154.9	100493.3	100339.2	100529.3	100388.2	100981.0	0.026	0.052	0.057	0.084	0.247	-1.313
0.167	0.992	0.966	103393.2	100475.1	100301.9	100549.6	100301.2	101004.2	0.029	0.083	0.058	0.088	-1.041	-1.282
0.208	0.993	0.966	103529.5	100435.6	100290.1	100537.4	100217.9	101012.6	0.031	0.101	0.046	0.091	-1.643	-0.924
0.250	0.994	0.966	103629.4	100412.8	100298.5	100568.4	100209.1	101023.6	0.031	0.110	0.035	0.093	-1.896	-0.601
0.292	0.995	0.966	103686.8	100387.1	100309.9	100583.1	100199.5	101033.3	0.032	0.116	0.023	0.094	-1.995	-0.251
0.333	0.993	0.966	103490.8	100376.6	100358.3	100584.6	100212.6	101004.6	0.030	0.120	0.006	0.090	-1.908	0.270
0.375	0.990	0.966	103251.7	100381.6	100368.5	100549.1	100299.2	100970.0	0.028	0.088	0.005	0.086	-0.692	0.276
0.417	0.989	0.966	103116.1	100428.9	100426.3	100551.6	100378.0	100980.2	0.026	0.065	0.001	0.083	0.202	0.337
0.458	0.989	0.966	103165.1	100469.3	100417.3	100541.2	100441.0	101006.8	0.026	0.037	0.019	0.084	1.060	-0.262
0.500	0.992	0.966	103429.8	100441.6	100353.4	100515.2	100370.4	101022.1	0.029	0.048	0.029	0.089	0.455	-0.501
0.542	0.993	0.966	103517.0	100441.4	100309.0	100546.8	100289.5	101020.7	0.030	0.082	0.042	0.090	-0.957	-0.827
0.583	0.994	0.966	103673.7	100414.4	100293.8	100567.3	100208.6	101031.6	0.032	0.109	0.037	0.093	-1.870	-0.642
0.625	0.994	0.966	103673.2	100383.4	100277.6	100565.8	100211.8	101022.4	0.032	0.107	0.032	0.094	-1.775	-0.506
0.667	0.993	0.966	103546.5	100402.4	100347.5	100584.5	100273.3	101030.8	0.030	0.099	0.017	0.091	-1.321	-0.086
0.708	0.991	0.966	103365.1	100402.0	100364.5	100568.6	100316.5	101003.3	0.029	0.085	0.013	0.088	-0.725	0.037
0.750	0.990	0.966	103193.9	100420.0	100395.0	100552.9	100405.2	100993.2	0.027	0.054	0.009	0.085	0.513	0.081
0.792	0.990	0.966	103249.3	100461.0	100403.6	100544.5	100394.1	101010.5	0.027	0.054	0.021	0.085	0.407	-0.253
0.833	0.991	0.966	103366.1	100482.1	100420.5	100546.3	100445.6	101052.1	0.028	0.035	0.021	0.087	1.062	-0.308
0.875	0.993	0.966	103590.9	100466.6	100370.4	100570.5	100402.2	101080.1	0.030	0.054	0.031	0.091	0.186	-0.520
0.917	0.995	0.966	103750.2	100440.0	100323.2	100558.8	100286.0	101071.6	0.032	0.081	0.035	0.094	-0.941	-0.598
0.958	0.996	0.966	103848.6	100399.1	100327.6	100583.2	100243.7	101080.5	0.033	0.098	0.021	0.096	-1.419	-0.172
1.000	0.996	0.966	103873.9	100347.8	100306.0	100566.3	100210.3	101060.9	0.034	0.101	0.012	0.097	-1.459	0.090

Survey Location 17

y/S	Cpt1	Cps1	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.987	0.966	102899.2	100471.3	100351.2	100566.5	100427.4	100943.1	0.024	0.057	0.049	0.080	0.294	-1.115
0.042	0.985	0.966	102703.9	100516.6	100353.7	100548.5	100481.5	100920.8	0.022	0.030	0.073	0.076	1.205	-1.902
0.083	0.986	0.966	102822.4	100540.9	100317.0	100533.2	100432.4	100929.2	0.023	0.043	0.095	0.078	0.581	-2.453
0.125	0.988	0.966	103044.9	100550.6	100230.2	100532.3	100411.3	100953.9	0.025	0.046	0.123	0.082	0.076	-3.173
0.167	0.991	0.966	103360.6	100532.0	100228.4	100537.7	100335.0	100998.7	0.029	0.069	0.103	0.087	-0.880	-2.545
0.208	0.992	0.966	103430.7	100507.0	100197.8	100555.6	100248.3	100987.9	0.030	0.101	0.101	0.089	-2.012	-2.475
0.250	0.993	0.966	103591.2	100428.8	100197.5	100544.1	100202.5	100992.8	0.031	0.105	0.071	0.092	-2.033	-1.638
0.292	0.994	0.966	103636.3	100412.8	100275.2	100585.8	100232.9	101028.6	0.031	0.108	0.042	0.093	-1.889	-0.809
0.333	0.992	0.966	103430.6	100402.2	100329.8	100572.7	100213.3	100989.7	0.029	0.118	0.024	0.089	-1.951	-0.272
0.375	0.990	0.966	103219.6	100407.9	100400.9	100576.4	100306.0	100982.2	0.027	0.097	0.003	0.085	-0.955	0.346
0.417	0.987	0.966	102943.2	100459.4	100374.8	100533.5	100430.8	100948.3	0.024	0.041	0.034	0.080	0.903	-0.705
0.458	0.987	0.966	102935.0	100517.8	100410.3	100536.9	100450.0	100970.0	0.024	0.035	0.044	0.080	1.067	-1.011
0.500	0.991	0.966	103281.2	100530.1	100284.6	100532.5	100388.2	101003.3	0.028	0.051	0.086	0.086	-0.019	-2.132
0.542	0.992	0.966	103478.6	100508.5	100196.7	100546.4	100316.3	101009.3	0.030	0.075	0.101	0.089	-1.172	-2.474
0.583	0.993	0.965	103556.7	100407.9	100186.1	100519.3	100211.3	100976.3	0.031	0.095	0.069	0.092	-1.686	-1.567
0.625	0.993	0.966	103590.1	100428.6	100263.6	100489.7	100311.5	101016.7	0.031	0.055	0.051	0.092	-0.098	-1.103
0.667	0.993	0.966	103560.6	100434.6	100352.6	100601.3	100301.4	101050.1	0.030	0.096	0.026	0.091	-1.276	-0.344
0.708	0.989	0.966	103098.8	100484.7	100397.9	100579.2	100343.2	100980.8	0.026	0.089	0.033	0.083	-0.822	-0.570
0.750	0.988	0.966	103048.9	100504.1	100397.9	100571.3	100461.3	100996.7	0.025	0.043	0.041	0.082	0.764	-0.910
0.792	0.988	0.966	103066.1	100542.0	100321.4	100540.4	100455.8	100985.1	0.025	0.033	0.085	0.082	0.833	-2.173
0.833	0.991	0.966	103342.8	100531.6	100250.3	100529.5	100359.7	101002.8	0.028	0.058	0.096	0.087	-0.425	-2.383
0.875	0.994	0.965	103660.3	100488.3	100147.7	100487.2	100250.1	101006.7	0.032	0.071	0.103	0.093	-1.209	-2.500
0.917	0.995	0.966	103769.9	100487.6	100180.9	100574.8	100258.8	101054.4	0.033	0.093	0.090	0.094	-1.868	-2.152
0.958	0.996	0.966	103885.4	100421.3	100218.7	100589.7	100227.3	101068.5	0.034	0.103	0.058	0.096	-1.924	-1.235
1.000	0.996	0.966	103843.8	100374.0	100285.8	100597.7	100228.1	101065.9	0.033	0.106	0.025	0.096	-1.747	-0.309

B.   WAKE SURVEYS

Survey Location 1

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.997	102621.3	99979.6	99987.1	100307.9	99734.9	100526.2	0.026	0.219	-0.003	0.082	-4.523	0.634
0.042	0.997	102605.1	99971.4	100007.3	100278.1	99744.1	100521.2	0.025	0.205	-0.014	0.082	-4.105	0.960
0.083	0.996	102505.1	99956.1	100020.6	100251.9	99760.0	100498.8	0.024	0.196	-0.026	0.080	-3.742	1.328
0.125	0.995	102389.8	99971.9	100049.1	100229.6	99798.5	100487.7	0.023	0.181	-0.033	0.078	-3.182	1.524
0.167	0.993	102192.0	99968.2	100077.1	100243.7	99827.3	100461.7	0.021	0.193	-0.050	0.075	-3.307	2.070
0.208	0.991	101993.7	99976.8	100107.4	100176.0	99875.8	100425.9	0.019	0.153	-0.067	0.072	-1.987	2.461
0.250	0.990	101805.2	99959.6	100131.0	100184.2	99882.5	100392.5	0.017	0.171	-0.097	0.068	-2.342	3.313
0.292	0.988	101699.0	99972.8	100155.0	100159.4	99921.1	100381.5	0.016	0.145	-0.111	0.066	-1.528	3.625
0.333	0.987	101606.1	99969.3	100161.1	100157.3	99906.7	100360.1	0.015	0.161	-0.123	0.065	-1.943	3.958
0.375	0.987	101533.6	99985.3	100154.4	100174.2	99895.2	100348.5	0.015	0.188	-0.114	0.063	-2.733	3.738
0.417	0.987	101550.9	100000.4	100157.4	100172.4	99877.6	100351.7	0.015	0.197	-0.105	0.064	-2.991	3.506
0.458	0.988	101639.1	100007.1	100123.5	100175.2	99852.1	100359.4	0.016	0.202	-0.073	0.065	-3.246	2.680
0.500	0.989	101762.0	99999.4	100104.9	100194.9	99825.3	100377.3	0.017	0.214	-0.061	0.068	-3.635	2.386
0.542	0.991	101905.1	99985.1	100085.7	100208.5	99804.9	100397.9	0.018	0.214	-0.053	0.070	-3.742	2.180
0.583	0.992	102046.9	99989.8	100062.3	100229.9	99772.5	100420.3	0.020	0.225	-0.036	0.073	-4.172	1.692
0.625	0.993	102163.0	99991.3	100074.7	100250.1	99769.0	100449.6	0.021	0.225	-0.039	0.074	-4.235	1.784
0.667	0.993	102201.1	99980.2	100046.6	100300.9	99780.0	100461.7	0.021	0.240	-0.031	0.075	-4.694	1.563
0.708	0.994	102261.5	100049.2	100058.1	100302.8	99791.6	100492.6	0.022	0.231	-0.004	0.075	-4.527	0.751
0.750	0.995	102307.7	100095.7	100040.4	100326.4	99797.6	100513.6	0.022	0.236	0.025	0.076	-4.715	-0.103
0.792	0.994	102314.3	100093.2	100004.9	100316.2	99817.2	100509.2	0.022	0.221	0.039	0.076	-4.354	-0.568
0.833	0.994	102315.2	100116.1	99971.0	100302.8	99823.8	100505.8	0.022	0.212	0.064	0.077	-4.156	-1.321
0.875	0.995	102354.8	100114.4	99963.7	100299.8	99833.7	100513.3	0.022	0.202	0.065	0.077	-3.944	-1.386
0.917	0.994	102330.8	100136.0	99956.2	100288.1	99827.2	100507.7	0.022	0.202	0.079	0.077	-3.950	-1.768
0.958	0.995	102348.0	100144.5	99957.7	100312.3	99829.1	100518.3	0.022	0.211	0.082	0.077	-4.197	-1.836
1.000	0.994	102335.6	100153.4	99969.5	100291.2	99835.3	100517.0	0.022	0.201	0.081	0.077	-3.906	-1.826

Survey Location 2

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.997	102621.3	99979.6	99987.1	100307.9	99734.9	100526.2	0.026	0.219	-0.003	0.080	-2.569	0.122
0.042	0.997	102605.1	99971.4	100007.3	100278.1	99744.1	100521.2	0.025	0.205	-0.014	0.081	-2.115	0.236
0.083	0.996	102505.1	99956.1	100020.6	100251.9	99760.0	100498.8	0.024	0.196	-0.026	0.079	-1.751	0.403
0.125	0.995	102389.8	99971.3	100049.1	100229.6	99798.5	100487.7	0.023	0.181	-0.033	0.078	-0.831	0.903
0.167	0.993	102192.0	99968.2	100077.1	100243.7	99827.3	100461.7	0.021	0.193	-0.050	0.075	1.052	1.066
0.208	0.991	101993.7	99976.8	100107.4	100176.0	99875.8	100425.9	0.019	0.153	-0.067	0.074	1.432	1.833
0.250	0.990	101805.2	99959.6	100131.0	100184.2	99882.5	100392.5	0.017	0.171	-0.097	0.071	1.823	2.434
0.292	0.988	101699.0	99972.8	100155.0	100159.4	99921.1	100381.5	0.016	0.145	-0.111	0.068	2.002	2.860
0.333	0.987	101606.1	99969.3	100161.1	100157.3	99906.7	100360.1	0.015	0.161	-0.123	0.065	1.138	2.766
0.375	0.987	101533.6	99985.3	100154.4	100174.2	99895.2	100348.5	0.015	0.188	-0.114	0.064	0.672	2.309
0.417	0.987	101550.9	100000.4	100157.4	100172.4	99877.6	100351.7	0.015	0.197	-0.105	0.063	-0.838	2.122
0.458	0.988	101639.1	100007.1	100123.5	100175.2	99852.1	100359.4	0.016	0.202	-0.073	0.064	0.708	1.156
0.500	0.989	101762.0	99999.4	100104.9	100194.9	99825.3	100377.3	0.017	0.214	-0.061	0.067	-2.189	1.355
0.542	0.991	101905.1	99985.1	100085.7	100208.5	99804.9	100397.9	0.018	0.214	-0.053	0.070	0.381	0.615
0.583	0.992	102046.9	99989.8	100062.3	100229.9	99772.5	100420.3	0.020	0.225	-0.036	0.073	-3.405	0.850
0.625	0.993	102163.0	99991.3	100074.7	100250.1	99769.0	100449.6	0.021	0.225	-0.039	0.074	-3.212	0.991
0.667	0.993	102201.1	99980.2	100046.6	100300.9	99780.0	100461.7	0.021	0.240	-0.031	0.075	-3.116	0.626
0.708	0.994	102261.5	100049.2	100058.1	100302.8	99791.6	100492.6	0.022	0.231	-0.004	0.076	-1.175	0.414
0.750	0.995	102307.7	100095.7	100040.4	100326.4	99797.6	100513.6	0.022	0.236	0.025	0.076	-1.088	0.129
0.792	0.994	102314.3	100093.2	100004.9	100316.2	99817.2	100509.2	0.022	0.221	0.039	0.076	-3.734	-0.113
0.833	0.994	102315.2	100116.1	99971.0	100302.8	99823.8	100505.8	0.022	0.212	0.064	0.077	-3.203	-0.692
0.875	0.995	102354.8	100114.4	99963.7	100299.8	99833.7	100513.3	0.022	0.202	0.065	0.077	-3.159	-0.653
0.917	0.994	102330.8	100136.0	99956.2	100288.1	99827.2	100507.7	0.022	0.202	0.079	0.076	-2.343	-0.651
0.958	0.995	102348.0	100144.5	99957.7	100312.3	99829.1	100518.3	0.022	0.211	0.082	0.076	-2.303	-1.011
1.000	0.994	102335.6	100153.4	99969.5	100291.2	99835.3	100517.0	0.022	0.201	0.081	0.075	0.976	-0.318

Survey Location 3

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.998	103348.1	100805.0	100744.4	100925.4	100598.3	101284.2	0.025	0.127	0.023	0.082	-1.904	-0.261
0.042	0.998	103324.2	100798.2	100753.3	100938.9	100590.9	101281.1	0.025	0.136	0.018	0.081	-2.141	-0.074
0.083	0.997	103283.7	100789.3	100772.7	100939.3	100613.7	101279.7	0.024	0.130	0.007	0.080	-1.861	0.251
0.125	0.997	103223.2	100753.1	100772.7	100888.4	100656.3	101258.7	0.024	0.094	-0.008	0.080	-0.631	0.641
0.167	0.996	103111.5	100719.9	100774.8	100809.7	100723.9	101228.0	0.023	0.036	-0.023	0.078	1.421	0.968
0.208	0.994	102933.3	100699.0	100815.5	100811.0	100705.4	101192.8	0.021	0.049	-0.054	0.075	1.171	1.885
0.250	0.992	102750.1	100701.8	100832.3	100812.5	100774.4	101174.2	0.019	0.019	-0.066	0.072	2.146	2.171
0.292	0.991	102580.7	100756.9	100795.0	100810.3	100776.5	101143.9	0.018	0.019	-0.021	0.068	2.016	0.798
0.333	0.989	102459.4	100764.4	100823.2	100840.2	100781.0	101133.7	0.016	0.036	-0.035	0.066	1.525	1.254
0.375	0.989	102474.6	100772.2	100796.7	100842.6	100727.3	101122.7	0.016	0.068	-0.014	0.066	0.480	0.719
0.417	0.990	102494.5	100767.1	100770.9	100859.8	100744.1	101127.3	0.017	0.068	-0.002	0.067	0.465	0.357
0.458	0.990	102522.2	100771.7	100769.0	100883.7	100710.9	101131.5	0.017	0.099	0.002	0.067	-0.504	0.338
0.500	0.991	102652.4	100758.1	100734.7	100878.7	100642.1	101133.2	0.018	0.125	0.012	0.070	-1.342	0.090
0.542	0.993	102839.9	100773.9	100745.6	100936.1	100594.4	101178.0	0.020	0.164	0.014	0.073	-2.600	0.126
0.583	0.994	102919.2	100790.2	100737.0	100973.3	100543.7	101192.7	0.021	0.199	0.025	0.074	-3.647	-0.149
0.625	0.995	103030.6	100772.9	100743.0	101021.9	100494.7	101212.6	0.022	0.232	0.013	0.076	-4.606	0.229
0.667	0.996	103093.7	100806.8	100774.9	101075.5	100527.6	101255.7	0.022	0.238	0.014	0.077	-4.802	0.215
0.708	0.996	103153.0	100796.8	100775.0	101072.9	100511.0	101261.7	0.023	0.238	0.009	0.078	-4.825	0.339
0.750	0.996	103148.6	100807.6	100791.2	101068.2	100507.9	101264.7	0.023	0.238	0.007	0.077	-4.822	0.409
0.792	0.996	103162.7	100803.2	100795.9	101043.8	100531.0	101267.3	0.023	0.216	0.003	0.078	-4.238	0.484
0.833	0.997	103220.9	100828.7	100765.1	101017.0	100572.7	101280.9	0.023	0.183	0.026	0.079	-3.417	-0.277
0.875	0.996	103226.3	100805.6	100767.2	100973.7	100535.2	101261.6	0.024	0.179	0.016	0.079	-3.284	0.033
0.917	0.997	103227.1	100823.4	100772.2	100980.8	100621.6	101285.0	0.024	0.148	0.021	0.079	-2.405	-0.161
0.958	0.997	103222.3	100839.4	100790.4	100982.7	100606.0	101288.2	0.023	0.156	0.020	0.079	-2.620	-0.127
1.000	0.997	103220.5	100815.7	100800.6	100974.6	100667.3	101295.7	0.023	0.128	0.006	0.079	-1.722	0.261

Survey Location 4

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.998	103349.0	100828.9	100742.2	100993.9	100551.5	101293.1	0.025	0.172	0.034	0.081	-3.256	-0.537
0.042	0.998	103339.7	100846.8	100745.5	101000.6	100582.7	101303.1	0.025	0.164	0.040	0.081	-3.035	-0.720
0.083	0.998	103328.3	100876.1	100793.4	100984.8	100628.7	101322.3	0.024	0.142	0.033	0.080	-2.345	-0.528
0.125	0.997	103221.2	100800.4	100803.7	100851.6	100778.6	101291.1	0.023	0.030	-0.001	0.079	1.513	0.299
0.167	0.995	103065.0	100766.5	100757.5	100828.2	100698.1	101223.0	0.022	0.056	0.004	0.077	0.627	0.196
0.208	0.993	102800.2	100798.2	100803.6	100823.6	100774.2	101200.0	0.019	0.025	-0.003	0.072	1.768	0.279
0.250	0.992	102752.7	100789.2	100780.4	100792.3	100782.7	101179.5	0.019	0.005	0.004	0.071	2.386	0.006
0.292	0.991	102625.0	100809.0	100783.9	100815.5	100797.8	101166.2	0.018	0.010	0.014	0.069	2.197	-0.272
0.333	0.991	102617.8	100793.2	100741.2	100816.5	100768.1	101147.4	0.018	0.026	0.028	0.069	1.630	-0.653
0.375	0.991	102663.6	100801.6	100716.8	100822.8	100722.2	101145.4	0.018	0.053	0.045	0.070	0.730	-1.054
0.417	0.992	102732.5	100810.3	100732.0	100840.8	100725.2	101168.2	0.019	0.059	0.040	0.071	0.532	-0.896
0.458	0.993	102820.7	100826.1	100710.4	100863.8	100672.7	101178.7	0.020	0.093	0.056	0.073	-0.624	-1.275
0.500	0.994	102945.6	100812.2	100704.5	100902.6	100599.8	101192.9	0.021	0.138	0.049	0.075	-2.036	-0.980
0.542	0.995	103092.8	100819.8	100692.6	100978.5	100548.9	101226.5	0.023	0.184	0.054	0.077	-3.444	-1.094
0.583	0.995	103133.2	100792.9	100686.8	100997.2	100474.5	101216.9	0.023	0.218	0.044	0.078	-4.375	-0.762
0.625	0.996	103190.6	100835.2	100716.9	101053.5	100504.1	101260.1	0.023	0.228	0.049	0.079	-4.644	-0.891
0.667	0.996	103211.2	100789.2	100727.9	101059.1	100497.6	101257.0	0.024	0.230	0.025	0.079	-4.692	-0.177
0.708	0.997	103265.2	100809.8	100723.5	101068.4	100500.6	101273.5	0.024	0.228	0.035	0.080	-4.693	-0.483
0.750	0.997	103236.7	100806.9	100757.7	101067.2	100535.5	101280.8	0.024	0.217	0.020	0.079	-4.353	-0.048
0.792	0.997	103293.1	100772.2	100763.8	101039.1	100481.0	101269.8	0.024	0.221	0.003	0.080	-4.489	0.458
0.833	0.997	103318.1	100801.1	100747.4	101012.7	100535.8	101283.0	0.025	0.187	0.021	0.081	-3.619	-0.138
0.875	0.998	103341.7	100796.5	100779.9	100992.7	100522.1	101286.6	0.025	0.183	0.006	0.081	-3.479	0.304
0.917	0.998	103361.5	100770.0	100778.4	100962.5	100577.0	101289.9	0.025	0.149	-0.003	0.082	-2.452	0.570
0.958	0.998	103331.3	100781.0	100799.7	100982.5	100607.2	101300.4	0.025	0.148	-0.007	0.081	-2.366	0.696
1.000	0.997	103321.0	100790.2	100811.4	100981.9	100628.2	101306.5	0.024	0.141	-0.008	0.080	-2.123	0.720

Survey Location 5

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.998	103350.3	100839.0	100671.7	101014.7	100516.4	101278.4	0.025	0.192	0.065	0.082	-3.906	-1.443
0.042	0.997	103310.7	100845.4	100691.3	101002.6	100488.3	101267.6	0.025	0.201	0.060	0.081	-4.095	-1.302
0.083	0.997	103254.7	100830.9	100716.2	100964.9	100558.1	101265.0	0.024	0.164	0.046	0.080	-2.991	-0.898
0.125	0.996	103149.1	100844.2	100735.5	100919.2	100672.3	101264.1	0.023	0.105	0.046	0.078	-1.168	-0.949
0.167	0.994	102943.1	100826.4	100767.5	100885.2	100754.7	101235.4	0.021	0.061	0.028	0.074	0.436	-0.510
0.208	0.993	102780.2	100842.9	100759.0	100847.3	100791.1	101204.1	0.019	0.029	0.043	0.072	1.486	-1.055
0.250	0.992	102693.3	100858.5	100769.0	100845.0	100800.2	101193.2	0.018	0.024	0.048	0.070	1.636	-1.230
0.292	0.992	102692.8	100855.5	100747.3	100823.4	100804.0	101184.6	0.018	0.010	0.057	0.070	2.029	-1.552
0.333	0.993	102801.8	100856.1	100726.8	100837.8	100784.4	101201.4	0.019	0.027	0.065	0.072	1.453	-1.701
0.375	0.993	102839.9	100843.7	100690.9	100839.3	100761.0	101195.0	0.020	0.038	0.074	0.073	1.027	-1.939
0.417	0.995	102979.4	100844.5	100686.0	100859.4	100710.3	101215.9	0.021	0.068	0.072	0.075	-0.005	-1.772
0.458	0.995	103033.5	100857.8	100653.7	100910.5	100620.2	101215.1	0.022	0.128	0.090	0.077	-1.952	-2.167
0.500	0.996	103142.9	100850.2	100651.1	100957.6	100522.3	101224.8	0.023	0.182	0.083	0.079	-3.508	-1.938
0.542	0.997	103227.4	100850.5	100654.9	101008.0	100505.3	101249.2	0.024	0.203	0.079	0.080	-4.121	-1.824
0.583	0.997	103237.5	100852.6	100680.3	101054.2	100511.7	101267.3	0.024	0.220	0.070	0.080	-4.525	-1.535
0.625	0.998	103283.1	100855.6	100688.7	101080.5	100506.8	101282.9	0.024	0.229	0.067	0.080	-4.783	-1.439
0.667	0.997	103247.8	100838.5	100703.4	101106.9	100502.8	101279.9	0.024	0.246	0.055	0.080	-5.156	-1.043
0.708	0.997	103247.6	100827.5	100744.0	101109.3	100497.3	101285.1	0.024	0.249	0.034	0.079	-5.234	-0.407
0.750	0.997	103276.0	100829.5	100728.4	101103.3	100471.8	101281.8	0.024	0.253	0.041	0.080	-5.372	-0.604
0.792	0.998	103314.8	100810.1	100746.8	101092.0	100477.4	101288.2	0.025	0.243	0.025	0.080	-5.105	-0.169
0.833	0.998	103325.2	100802.2	100772.5	101074.2	100528.9	101300.6	0.024	0.215	0.012	0.080	-4.357	0.188
0.875	0.998	103351.8	100773.8	100790.3	101048.6	100525.9	101298.1	0.025	0.204	-0.006	0.081	-4.028	0.732
0.917	0.998	103387.1	100777.8	100785.0	101041.9	100547.4	101307.8	0.025	0.190	-0.003	0.082	-3.681	0.597
0.958	0.998	103378.6	100766.4	100785.1	101020.5	100532.9	101296.7	0.025	0.187	-0.007	0.082	-3.590	0.731
1.000	0.998	103434.3	100690.1	100703.1	100893.2	100586.5	101261.4	0.026	0.113	-0.005	0.084	-1.396	0.581

Survey Location 6

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.998	103381.4	100864.8	100694.1	101090.9	100479.9	101302.2	0.025	0.235	0.066	0.082	-5.000	-1.427
0.042	0.997	103333.0	100812.6	100691.3	101014.8	100402.4	101250.8	0.025	0.235	0.047	0.082	-4.985	-0.859
0.083	0.997	103284.6	100705.4	100531.1	100909.4	100328.9	101151.9	0.026	0.218	0.065	0.083	-4.617	-1.465
0.125	0.996	103176.1	100767.4	100608.4	100904.1	100475.8	101186.4	0.024	0.172	0.064	0.080	-3.288	-1.414
0.167	0.993	102865.9	100731.6	100634.6	100814.3	100575.6	101124.4	0.021	0.110	0.045	0.075	-1.172	-0.897
0.208	0.991	102731.3	100794.4	100685.8	100760.3	100722.0	101138.7	0.019	0.019	0.055	0.072	1.735	-1.431
0.250	0.991	102679.5	100826.5	100772.0	100803.2	100794.9	101175.2	0.018	0.004	0.029	0.070	2.315	-0.734
0.292	0.992	102737.1	100865.4	100718.6	100860.5	100800.6	101196.5	0.019	0.031	0.076	0.071	1.299	-2.031
0.333	0.993	102888.4	100842.4	100669.3	100854.1	100709.7	101192.8	0.021	0.068	0.082	0.074	0.003	-2.058
0.375	0.994	102984.1	100858.6	100654.1	100860.3	100728.7	101217.2	0.021	0.060	0.093	0.076	0.160	-2.377
0.417	0.995	103109.6	100867.3	100647.5	100907.1	100662.8	101238.9	0.023	0.104	0.094	0.078	-1.360	-2.316
0.458	0.996	103196.8	100854.7	100639.1	100946.1	100606.2	101248.6	0.024	0.140	0.089	0.079	-2.445	-2.128
0.500	0.997	103282.6	100853.0	100615.4	100964.3	100544.3	101252.0	0.025	0.165	0.094	0.081	-3.262	-2.270
0.542	0.997	103309.6	100860.8	100652.9	101031.3	100537.1	101278.3	0.025	0.195	0.082	0.081	-3.965	-1.928
0.583	0.997	103329.8	100893.8	100679.2	101100.7	100535.2	101307.7	0.024	0.224	0.085	0.081	-4.692	-1.980
0.625	0.997	103353.5	100869.1	100692.0	101096.9	100490.1	101300.3	0.025	0.236	0.069	0.081	-5.015	-1.511
0.667	0.998	103355.3	100879.4	100701.3	101121.0	100502.3	101311.8	0.025	0.242	0.070	0.081	-5.155	-1.517
0.708	0.997	103349.7	100862.9	100711.8	101115.8	100486.3	101305.3	0.025	0.246	0.059	0.081	-5.250	-1.195
0.750	0.998	103344.5	100845.1	100735.9	101109.5	100535.9	101314.2	0.025	0.226	0.043	0.081	-4.687	-0.750
0.792	0.998	103361.1	100825.3	100755.4	101096.4	100504.5	101308.5	0.025	0.231	0.027	0.081	-4.814	-0.270
0.833	0.998	103363.9	100814.4	100773.4	101090.0	100557.1	101319.8	0.025	0.209	0.016	0.081	-4.195	0.041
0.875	0.998	103394.7	100830.6	100782.9	101086.8	100554.8	101330.0	0.025	0.206	0.018	0.081	-4.154	-0.042
0.917	0.998	103391.7	100827.7	100770.9	101097.3	100554.1	101328.3	0.025	0.211	0.022	0.081	-4.280	-0.145
0.958	0.998	103410.5	100824.0	100770.0	101103.9	100526.4	101327.0	0.025	0.222	0.021	0.082	-4.599	-0.094
1.000	0.998	103413.2	100838.3	100768.1	101096.8	100552.8	101333.8	0.025	0.209	0.027	0.082	-4.270	-0.303

Survey Location 7

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.997	103453.7	101051.7	100937.0	101266.1	100713.2	101484.3	0.024	0.225	0.047	0.079	-4.592	-0.838
0.042	0.997	103427.1	101037.0	100902.7	101260.4	100716.1	101468.7	0.024	0.222	0.055	0.079	-4.536	-1.084
0.083	0.996	103333.0	101031.5	100904.9	101231.3	100726.9	101445.5	0.023	0.214	0.054	0.078	-4.243	-1.034
0.125	0.994	103108.0	100984.7	100906.9	101159.5	100786.9	101389.2	0.021	0.173	0.036	0.074	-2.958	-0.533
0.167	0.991	102832.9	100991.3	100950.8	101088.7	100946.6	101362.1	0.018	0.077	0.022	0.069	0.076	-0.324
0.208	0.988	102488.3	100979.7	100957.8	101050.0	101012.4	101297.6	0.015	0.025	0.015	0.063	1.714	-0.277
0.250	0.987	102399.2	101010.2	100983.0	101054.2	101040.7	101297.5	0.013	0.010	0.020	0.060	2.145	-0.470
0.292	0.987	102428.7	101011.8	100974.6	101046.8	101019.5	101296.2	0.014	0.019	0.026	0.061	1.856	-0.639
0.333	0.989	102607.5	101031.2	100971.7	101073.7	100985.4	101333.9	0.016	0.055	0.037	0.065	0.757	-0.852
0.375	0.990	102667.0	101046.1	100969.1	101104.7	100988.1	101355.0	0.016	0.071	0.047	0.065	0.261	-1.080
0.417	0.993	102965.7	101054.7	100948.3	101118.4	100960.5	101409.5	0.019	0.081	0.055	0.071	-0.187	-1.263
0.458	0.994	103156.9	101052.1	100902.6	101132.7	100871.5	101423.2	0.021	0.121	0.069	0.075	-1.570	-1.582
0.500	0.995	103266.8	101058.7	100910.1	101164.4	100828.9	101445.8	0.022	0.147	0.065	0.076	-2.418	-1.442
0.542	0.996	103375.8	101074.4	100893.9	101200.2	100793.1	101467.5	0.023	0.171	0.076	0.078	-3.185	-1.733
0.583	0.997	103411.9	101043.0	100913.6	101178.0	100715.7	101452.4	0.024	0.189	0.053	0.079	-3.655	-1.067
0.625	0.997	103439.0	101060.7	100908.3	101223.1	100743.1	101460.9	0.024	0.194	0.090	0.080	-3.911	-2.139
0.667	0.997	103436.6	101052.7	100832.9	101215.2	100742.6	101456.0	0.024	0.191	0.089	0.080	-3.829	-2.109
0.708	0.997	103437.7	101061.7	100885.0	101229.4	100788.2	101480.4	0.024	0.180	0.072	0.079	-3.484	-1.639
0.750	0.997	103405.8	101055.2	100904.5	101219.6	100798.1	101476.7	0.023	0.175	0.062	0.079	-3.277	-1.354
0.792	0.996	103394.5	101034.8	100893.4	101193.6	100784.1	101460.1	0.023	0.169	0.058	0.079	-3.125	-1.244
0.833	0.996	103394.2	101027.9	100884.3	101198.4	100796.6	101460.3	0.023	0.166	0.059	0.079	-3.042	-1.274
0.875	0.997	103458.0	101071.5	100911.3	101222.2	100790.7	101490.7	0.024	0.175	0.065	0.080	-3.346	-1.440
0.917	0.997	103489.1	101041.6	100877.8	101215.0	100765.9	101477.9	0.024	0.179	0.065	0.080	-3.480	-1.450
0.958	0.998	103505.6	101058.0	100894.9	101240.3	100773.9	101494.6	0.024	0.186	0.065	0.080	-3.658	-1.438
1.000	0.998	103503.9	101030.6	100898.9	101222.2	100772.0	101485.5	0.024	0.178	0.052	0.081	-3.441	-1.072

Survey Location 8

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.997	104314.7	101890.6	101775.3	102109.6	101588.4	102335.7	0.024	0.211	0.047	0.079	-4.221	-0.858
0.042	0.996	104235.4	101896.0	101758.0	102100.5	101576.7	102313.3	0.023	0.218	0.057	0.078	-4.379	-1.147
0.083	0.996	104171.3	101865.4	101774.2	102057.0	101602.8	102294.2	0.023	0.194	0.039	0.077	-3.649	-0.620
0.125	0.993	103931.1	101837.5	101803.8	102006.2	101683.7	102252.5	0.020	0.154	0.016	0.073	-2.298	0.034
0.167	0.988	103397.9	101833.4	101823.0	101934.4	101818.7	102161.5	0.015	0.075	0.007	0.063	0.255	0.108
0.208	0.987	103272.0	101882.8	101865.4	101909.4	101892.4	102164.4	0.013	0.012	0.013	0.060	2.089	-0.251
0.250	0.986	103124.8	101881.5	101871.5	101904.5	101896.7	102135.8	0.012	0.006	0.008	0.057	2.249	-0.133
0.292	0.986	103098.0	101897.7	101906.5	101921.6	101913.6	102147.5	0.012	0.007	-0.007	0.056	2.264	0.330
0.333	0.987	103244.6	101903.0	101863.4	101940.4	101871.3	102164.5	0.013	0.051	0.029	0.060	0.910	-0.634
0.375	0.989	103419.4	101903.4	101837.5	101946.2	101841.3	102189.6	0.015	0.068	0.043	0.063	0.375	-0.974
0.417	0.991	103656.2	101900.6	101816.3	101949.4	101797.2	102223.9	0.017	0.085	0.047	0.068	-0.199	-1.037
0.458	0.993	103915.0	101910.0	101806.7	101969.4	101731.0	102266.4	0.020	0.116	0.050	0.073	-1.270	-1.042
0.500	0.995	104034.9	101907.2	101776.8	102017.1	101667.5	102280.7	0.021	0.159	0.059	0.075	-2.650	-1.241
0.542	0.996	104204.6	101910.9	101772.1	102025.5	101622.8	102307.2	0.023	0.170	0.059	0.078	-3.080	-1.232
0.583	0.997	104271.2	101911.1	101777.1	102055.6	101568.4	102316.7	0.023	0.199	0.055	0.079	-3.918	-1.107
0.625	0.997	104281.8	101915.8	101787.3	102046.8	101617.8	102329.9	0.023	0.176	0.053	0.079	-3.283	-1.068
0.667	0.997	104299.7	101907.1	101788.8	102047.3	101644.3	102337.4	0.024	0.164	0.048	0.079	-2.965	-0.950
0.708	0.997	104267.5	101916.8	101805.9	102030.3	101629.8	102330.1	0.023	0.165	0.046	0.078	-2.962	-0.873
0.750	0.996	104207.4	101909.8	101803.7	102028.0	101667.6	102323.3	0.023	0.153	0.045	0.077	-2.559	-0.855
0.792	0.996	104229.8	101908.1	101812.4	102039.4	101669.6	102331.8	0.023	0.156	0.040	0.078	-2.636	-0.715
0.833	0.997	104283.9	101913.9	101805.7	102041.6	101617.3	102332.5	0.023	0.174	0.044	0.079	-3.206	-0.824
0.875	0.997	104306.5	101921.7	101799.5	102046.7	101609.3	102336.7	0.024	0.178	0.050	0.079	-3.342	-0.982
0.917	0.997	104340.0	101927.4	101788.9	102049.7	101652.4	102351.7	0.024	0.160	0.056	0.080	-2.899	-1.179
0.958	0.998	104393.5	101912.3	101803.3	102057.3	101640.7	102361.4	0.024	0.164	0.043	0.080	-3.014	-0.808
1.000	0.997	104355.3	101893.3	101816.0	102048.8	101631.1	102348.9	0.024	0.167	0.031	0.080	-3.016	-0.441

Survey Location 9

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.996	104224.0	101949.6	101740.1	102119.6	101580.8	102322.8	0.023	0.227	0.088	0.078	-4.645	-2.013
0.042	0.995	104140.3	101920.0	101731.5	102103.4	101597.5	102298.5	0.022	0.220	0.082	0.077	-4.402	-1.820
0.083	0.994	104031.3	101884.5	101779.5	102058.8	101638.2	102278.5	0.021	0.192	0.048	0.075	-3.511	-0.849
0.125	0.992	103807.2	101857.8	101793.0	101993.7	101727.4	102235.8	0.019	0.136	0.033	0.071	-1.742	-0.490
0.167	0.987	103335.0	101849.6	101862.3	101955.0	101864.6	102173.3	0.014	0.062	-0.009	0.061	0.663	0.519
0.208	0.987	103229.0	101879.4	101898.3	101924.3	101922.3	102170.7	0.013	0.002	-0.014	0.059	2.458	0.523
0.250	0.985	103033.2	101862.4	101874.2	101889.8	101920.6	102116.0	0.011	-0.027	-0.010	0.055	3.229	0.349
0.292	0.985	103013.9	101887.0	101882.8	101900.2	101939.7	102124.7	0.011	-0.036	0.004	0.054	3.431	-0.089
0.333	0.986	103132.1	101901.0	101851.3	101922.7	101882.9	102138.0	0.012	0.032	0.040	0.057	1.433	-1.008
0.375	0.987	103310.7	101897.0	101834.7	101955.4	101851.7	102169.9	0.014	0.073	0.044	0.061	0.251	-0.985
0.417	0.990	103628.9	101916.3	101801.2	101965.8	101800.1	102222.5	0.017	0.094	0.065	0.067	-0.505	-1.543
0.458	0.992	103769.5	101917.5	101774.2	101981.9	101715.1	102231.6	0.019	0.139	0.075	0.070	-1.913	-1.684
0.500	0.994	104009.0	101935.0	101780.2	102004.4	101686.4	102283.0	0.021	0.147	0.072	0.074	-2.321	-1.611
0.542	0.995	104142.1	101922.5	101751.1	102011.2	101641.1	102293.6	0.022	0.160	0.074	0.077	-2.812	-1.684
0.583	0.996	104241.4	101939.5	101764.9	102042.7	101626.5	102323.0	0.023	0.174	0.073	0.078	-3.246	-1.647
0.625	0.996	104221.4	101948.8	101774.2	102049.8	101619.8	102322.8	0.023	0.181	0.074	0.078	-3.428	-1.656
0.667	0.996	104202.8	101948.1	101779.4	102051.2	101655.1	102327.3	0.022	0.169	0.072	0.077	-3.072	-1.617
0.708	0.996	104154.6	101934.7	101787.6	102038.0	101677.1	102318.4	0.022	0.157	0.064	0.076	-2.687	-1.395
0.750	0.996	104157.1	101957.5	101782.3	102033.5	101629.4	102312.0	0.022	0.175	0.076	0.077	-3.218	-1.716
0.792	0.995	104145.6	101945.3	101781.5	102020.4	101670.8	102312.7	0.022	0.153	0.071	0.076	-2.578	-1.613
0.833	0.996	104229.8	101976.6	101763.0	102056.1	101653.3	102335.7	0.023	0.170	0.090	0.078	-3.179	-2.140
0.875	0.997	104264.5	101978.1	101754.1	102043.6	101649.0	102343.3	0.023	0.164	0.082	0.078	-3.031	-1.919
0.917	0.997	104330.1	101972.4	101754.8	102036.1	101656.9	102350.1	0.024	0.153	0.088	0.079	-2.827	-2.103
0.958	0.997	104352.2	101964.6	101775.9	102052.4	101667.2	102362.5	0.024	0.155	0.076	0.080	-2.839	-1.763
1.000	0.997	104308.7	101944.5	101781.1	102018.2	101699.6	102350.4	0.023	0.130	0.067	0.079	-2.075	-1.517

Survey Location 10

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.995	103975.4	101830.4	101566.4	101934.3	101391.1	102139.5	0.022	0.237	0.115	0.077	-4.913	-2.726
0.042	0.994	103825.9	101818.7	101588.3	101929.9	101463.4	102125.2	0.020	0.219	0.108	0.074	-4.343	-2.521
0.083	0.992	103669.4	101768.9	101608.6	101902.9	101529.3	102095.8	0.019	0.190	0.081	0.071	-3.397	-1.769
0.125	0.990	103403.1	101732.6	101666.9	101848.2	101661.1	102062.4	0.016	0.112	0.039	0.066	-0.930	-0.722
0.167	0.987	103101.5	101734.4	101731.4	101806.7	101756.2	102026.0	0.013	0.038	0.002	0.059	1.364	0.124
0.208	0.985	102915.8	101725.2	101741.5	101747.4	101759.9	101978.0	0.011	-0.011	-0.014	0.056	2.778	0.489
0.250	0.985	102883.1	101748.0	101742.9	101735.3	101798.4	101981.6	0.011	-0.056	0.005	0.055	4.012	-0.149
0.292	0.985	102881.8	101768.7	101741.2	101765.0	101802.2	101991.8	0.011	-0.033	0.025	0.054	3.311	-0.714
0.333	0.986	103004.6	101786.0	101697.0	101788.2	101746.2	102004.4	0.012	0.034	0.071	0.058	1.320	-1.921
0.375	0.988	103177.0	101779.1	101651.4	101788.4	101696.0	102018.4	0.014	0.064	0.088	0.062	0.420	-2.313
0.417	0.990	103443.7	101813.4	101616.7	101823.1	101633.3	102066.0	0.017	0.110	0.114	0.067	-1.062	-2.899
0.458	0.992	103665.6	101825.1	101617.7	101856.3	101611.3	102115.2	0.019	0.126	0.107	0.071	-1.648	-2.645
0.500	0.993	103786.5	101821.1	101598.3	101875.3	101562.0	102128.6	0.020	0.151	0.108	0.073	-2.455	-2.612
0.542	0.994	103910.6	101835.8	101596.7	101890.6	101520.5	102150.8	0.021	0.168	0.109	0.075	-3.032	-2.633
0.583	0.995	104003.3	101835.3	101591.6	101905.2	101454.7	102158.0	0.022	0.195	0.106	0.077	-3.827	-2.534
0.625	0.995	104013.3	101842.6	101600.4	101922.5	101505.0	102176.8	0.022	0.182	0.105	0.077	-3.468	-2.542
0.667	0.995	103967.4	101845.2	101592.6	101922.5	101464.8	102158.5	0.022	0.202	0.112	0.076	-3.989	-2.681
0.708	0.995	103972.9	101845.9	101619.5	101908.5	101520.7	102173.5	0.022	0.172	0.101	0.076	-3.165	-2.409
0.750	0.995	103952.0	101854.1	101619.8	101900.8	101551.1	102175.6	0.021	0.157	0.106	0.075	-2.752	-2.561
0.792	0.995	103990.7	101859.6	101600.8	101891.8	101540.5	102176.7	0.022	0.155	0.114	0.076	-2.753	-2.809
0.833	0.996	104068.2	101879.7	101589.2	101899.0	101517.0	102190.6	0.023	0.163	0.124	0.078	-3.070	-3.073
0.875	0.997	104123.1	101887.1	101573.7	101903.3	101524.0	102202.3	0.023	0.158	0.130	0.078	-3.024	-3.262
0.917	0.996	104113.8	101891.2	101578.1	101911.3	101527.0	102204.3	0.023	0.161	0.131	0.078	-3.089	-3.277
0.958	0.996	104094.8	101879.3	101578.6	101890.7	101536.4	102195.8	0.023	0.149	0.127	0.078	-2.746	-3.165
1.000	0.996	104083.6	101864.2	101589.5	101873.7	101565.2	102195.2	0.023	0.131	0.116	0.078	-2.201	-2.901

Survey Location 11

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.994	103846.7	101902.7	101502.8	101931.3	101458.9	102128.5	0.021	0.220	0.186	0.075	-4.561	-4.656
0.042	0.993	103745.0	101867.2	101556.8	101948.9	101502.0	102124.0	0.020	0.221	0.153	0.072	-4.426	-3.753
0.083	0.990	103499.9	101815.7	101603.1	101889.4	101578.3	102077.3	0.017	0.175	0.120	0.068	-2.968	-2.868
0.125	0.988	103226.3	101797.9	101682.8	101846.2	101751.4	102060.9	0.014	0.065	0.079	0.062	0.403	-2.042
0.167	0.986	102998.6	101749.5	101691.1	101775.5	101733.8	101989.7	0.012	0.033	0.046	0.058	1.392	-1.191
0.208	0.985	102890.4	101756.4	101701.9	101728.3	101735.4	101962.5	0.011	-0.006	0.047	0.056	2.494	-1.317
0.250	0.984	102869.3	101775.9	101709.0	101724.5	101747.4	101965.2	0.011	-0.020	0.059	0.055	2.849	-1.714
0.292	0.985	102949.7	101809.5	101695.4	101734.8	101751.9	101988.3	0.012	-0.014	0.095	0.057	2.594	-2.760
0.333	0.986	103082.4	101800.3	101600.1	101733.1	101677.3	101978.6	0.013	0.040	0.145	0.061	0.962	-4.036
0.375	0.988	103292.0	101843.8	101592.6	101801.5	101695.3	102045.0	0.015	0.068	0.161	0.064	0.124	-4.375
0.417	0.990	103444.8	101877.3	101572.5	101830.1	101650.9	102075.1	0.017	0.105	0.178	0.067	-1.023	-4.714
0.458	0.991	103566.4	101867.8	101543.5	101838.2	101570.0	102077.2	0.018	0.144	0.174	0.070	-2.241	-4.488
0.500	0.992	103698.6	101879.9	101561.5	101871.3	101549.3	102112.1	0.019	0.162	0.161	0.072	-2.815	-4.063
0.542	0.993	103804.8	101873.0	101594.9	101882.7	101483.5	102127.8	0.020	0.190	0.133	0.074	-3.602	-3.248
0.583	0.994	103832.4	101897.8	101560.4	101912.0	101534.9	102147.5	0.020	0.179	0.160	0.074	-3.368	-4.024
0.625	0.994	103843.9	101893.4	101546.4	101912.0	101478.4	102134.8	0.021	0.203	0.162	0.074	-4.037	-4.048
0.667	0.994	103868.5	101900.9	101556.3	101911.9	101539.2	102155.3	0.021	0.174	0.161	0.074	-3.265	-4.050
0.708	0.994	103849.4	101890.4	101552.4	101890.7	101475.9	102131.8	0.021	0.193	0.157	0.075	-3.772	-3.928
0.750	0.994	103880.7	101922.1	101563.0	101904.0	101535.8	102161.2	0.021	0.171	0.167	0.075	-3.215	-4.219
0.792	0.995	103928.7	101933.7	101547.1	101903.2	101525.6	102167.0	0.021	0.171	0.177	0.076	-3.296	-4.481
0.833	0.995	104001.5	101945.3	101524.2	101901.9	101526.9	102180.0	0.022	0.165	0.185	0.077	-3.218	-4.684
0.875	0.996	104016.4	101960.7	101541.2	101917.9	101534.1	102194.0	0.022	0.168	0.184	0.077	-3.316	-4.660
0.917	0.996	104044.1	101970.2	101571.3	101906.7	101544.1	102207.3	0.022	0.158	0.174	0.077	-3.032	-4.400
0.958	0.995	103985.3	101942.6	101520.9	101880.1	101485.8	102163.0	0.022	0.173	0.185	0.077	-3.438	-4.680
1.000	0.994	103878.0	101930.1	101547.9	101884.5	101583.2	102164.7	0.021	0.141	0.178	0.075	-2.407	-4.567

Survey Location 12

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.993	103054.6	101260.8	100724.0	101201.3	100749.5	101398.1	0.020	0.218	0.259	0.074	-4.673	-6.525
0.042	0.991	102845.2	101168.5	100772.4	101162.0	100785.3	101346.7	0.018	0.201	0.211	0.071	-3.951	-5.391
0.083	0.989	102631.3	101171.8	100855.6	101150.9	100961.6	101354.2	0.016	0.119	0.198	0.066	-1.424	-5.259
0.125	0.985	102269.6	101134.7	100889.5	101071.4	101016.8	101276.4	0.012	0.044	0.198	0.058	0.714	-5.514
0.167	0.984	102142.7	101150.1	100942.3	101034.8	101033.8	101260.7	0.011	0.001	0.189	0.055	1.891	-5.406
0.208	0.984	102119.6	101166.4	100945.9	100995.5	101053.2	101256.1	0.011	-0.053	0.204	0.054	3.303	-6.009
0.250	0.984	102174.8	101186.3	100887.6	100970.8	101087.3	101261.4	0.011	-0.102	0.262	0.055	4.418	-7.735
0.292	0.986	102303.0	101228.1	100844.3	101004.7	101025.8	101281.2	0.012	-0.017	0.300	0.059	2.136	-8.388
0.333	0.987	102404.7	101248.4	100779.9	101038.6	100994.4	101293.2	0.014	0.032	0.337	0.062	0.757	-9.134
0.375	0.988	102532.6	101258.1	100760.9	101060.3	100945.2	101311.4	0.015	0.075	0.326	0.065	-0.452	-8.721
0.417	0.989	102648.9	101285.6	100740.8	101092.3	100925.0	101338.5	0.016	0.102	0.333	0.067	-1.260	-8.797
0.458	0.990	102761.9	101280.7	100699.4	101102.5	100866.8	101342.3	0.017	0.133	0.328	0.069	-2.196	-8.540
0.500	0.991	102836.3	101306.2	100720.2	101140.2	100845.5	101369.7	0.018	0.161	0.320	0.070	-3.022	-8.249
0.542	0.992	102903.6	101313.0	100708.4	101159.5	100831.6	101383.2	0.018	0.173	0.318	0.072	-3.403	-8.139
0.583	0.992	102953.0	101309.7	100705.5	101176.2	100826.9	101394.3	0.019	0.179	0.310	0.072	-3.615	-7.897
0.625	0.993	103030.3	101316.3	100710.2	101181.0	100834.0	101414.4	0.020	0.172	0.300	0.074	-3.441	-7.623
0.667	0.993	103035.3	101314.1	100702.5	101190.1	100838.0	101416.0	0.020	0.174	0.302	0.074	-3.511	-7.666
0.708	0.993	103050.4	101314.5	100713.0	101176.2	100832.2	101417.3	0.020	0.168	0.295	0.074	-3.356	-7.487
0.750	0.993	103077.3	101325.7	100687.1	101169.0	100807.6	101413.3	0.020	0.174	0.307	0.075	-3.575	-7.739
0.792	0.994	103147.5	101343.3	100684.7	101175.6	100762.7	101422.7	0.021	0.191	0.305	0.076	-4.153	-7.604
0.833	0.994	103193.7	101348.0	100672.3	101183.1	100810.6	101441.5	0.021	0.170	0.309	0.076	-3.602	-7.699
0.875	0.995	103223.3	101348.4	100654.7	101172.3	100796.7	101439.1	0.022	0.168	0.311	0.077	-3.613	-7.730
0.917	0.994	103206.5	101350.1	100662.9	101176.5	100809.3	101441.1	0.021	0.166	0.311	0.077	-3.527	-7.762
0.958	0.993	103067.4	101319.2	100690.5	101168.4	100831.1	101415.3	0.020	0.163	0.304	0.074	-3.259	-7.714
1.000	0.991	102798.3	101255.0	100773.6	101139.9	100898.7	101373.1	0.017	0.135	0.270	0.069	-2.146	-7.095

Survey Location 13

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.992	102979.6	101294.1	100695.5	101179.7	100799.6	101389.7	0.019	0.191	0.301	0.073	-3.966	-7.633
0.042	0.990	102797.8	101236.7	100772.9	101171.8	100841.5	101364.1	0.017	0.184	0.259	0.069	-3.537	-6.707
0.083	0.987	102454.4	101199.5	100859.4	101111.8	101009.4	101326.9	0.014	0.073	0.241	0.062	-0.175	-6.595
0.125	0.984	102174.7	101211.5	100908.4	101083.5	101027.6	101281.1	0.011	0.050	0.272	0.055	0.296	-7.516
0.167	0.983	102063.8	101237.2	100905.5	101028.6	101015.8	101250.2	0.010	0.013	0.326	0.053	1.182	-9.006
0.208	0.984	102074.5	101290.9	100833.2	100950.1	100975.0	101224.7	0.010	-0.024	0.431	0.054	2.077	-11.619
0.250	0.985	102200.7	101324.1	100778.4	100950.4	100986.5	101248.0	0.012	-0.030	0.458	0.057	2.342	-12.253
0.292	0.986	102356.2	101364.4	100747.0	100970.7	100947.5	101271.4	0.013	0.017	0.477	0.060	0.953	-12.454
0.333	0.986	102420.1	101391.2	100684.9	101004.8	100929.2	101286.0	0.014	0.053	0.498	0.061	-0.180	-12.783
0.375	0.988	102503.5	101404.0	100672.7	101022.5	100919.8	101304.5	0.015	0.069	0.488	0.063	-0.608	-12.479
0.417	0.988	102552.8	101414.7	100609.6	101008.4	100848.6	101286.8	0.015	0.101	0.509	0.064	-1.615	-12.718
0.458	0.989	102669.1	101430.5	100632.5	101063.8	100869.9	101333.2	0.016	0.116	0.478	0.066	-2.017	-11.995
0.500	0.990	102735.0	101439.4	100584.5	101040.2	100821.6	101324.1	0.017	0.124	0.485	0.068	-2.282	-12.062
0.542	0.990	102777.1	101433.7	100608.0	101089.3	100806.9	101343.0	0.017	0.158	0.461	0.069	-3.245	-11.360
0.583	0.991	102813.7	101432.9	100621.8	101101.1	100815.5	101357.0	0.018	0.157	0.445	0.069	-3.207	-11.050
0.625	0.991	102869.7	101438.2	100610.9	101106.5	100800.1	101365.1	0.018	0.163	0.440	0.071	-3.411	-10.869
0.667	0.991	102922.8	101440.7	100581.7	101082.0	100728.1	101351.1	0.019	0.180	0.437	0.072	-3.982	-10.658
0.708	0.992	103019.2	101440.0	100572.8	101075.7	100795.1	101380.6	0.020	0.137	0.423	0.074	-2.723	-10.562
0.750	0.993	103050.9	101441.1	100546.5	101077.9	100758.5	101375.0	0.020	0.152	0.427	0.074	-3.249	-10.512
0.792	0.994	103139.3	101439.3	100574.9	100878.4	100801.6	101366.8	0.021	0.035	0.390	0.076	0.377	-10.240
0.833	0.994	103137.5	101443.9	100573.5	101121.2	100778.8	101411.0	0.021	0.159	0.403	0.076	-3.457	-9.903
0.875	0.994	103156.5	101428.3	100557.5	101114.7	100758.5	101403.1	0.021	0.163	0.397	0.076	-3.601	-9.720
0.917	0.993	103121.4	101392.9	100630.8	101150.3	100811.6	101421.4	0.021	0.159	0.359	0.075	-3.341	-8.933
0.958	0.992	102975.1	101335.1	100706.5	101129.5	100840.3	101397.3	0.019	0.147	0.319	0.073	-2.721	-8.165
1.000	0.989	102624.9	101283.3	100772.1	101079.8	100960.6	101344.1	0.016	0.074	0.319	0.066	-0.422	-8.537

Survey Location 14

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.991	103052.8	101446.1	100836.6	101309.2	100979.9	101524.9	0.019	0.172	0.319	0.072	-3.409	-8.158
0.042	0.989	102778.1	101387.2	100942.7	101311.6	101041.8	101492.3	0.016	0.168	0.277	0.066	-3.041	-7.286
0.083	0.986	102505.6	101375.3	101019.8	101270.2	101467.5	101467.5	0.013	0.080	0.274	0.060	-0.486	-7.474
0.125	0.984	102299.3	101376.3	101073.0	101246.1	101195.5	101438.1	0.011	0.047	0.282	0.054	0.333	-7.792
0.167	0.983	102169.6	101496.1	101090.3	101199.3	101190.1	101429.1	0.009	0.010	0.438	0.051	0.997	-11.680
0.208	0.983	102224.0	101545.4	100993.6	101131.2	101161.4	101411.1	0.010	-0.030	0.543	0.053	2.034	-14.455
0.250	0.985	102344.5	101580.5	100912.7	101121.1	101135.8	101418.9	0.011	-0.013	0.577	0.040	0.000	0.000
0.292	0.986	102429.4	101644.5	100800.9	101112.8	101091.6	101415.8	0.012	0.017	0.666	0.040	0.000	0.000
0.333	0.987	102543.3	101648.5	100802.1	101100.0	101038.7	101426.5	0.014	0.044	0.606	0.040	0.000	0.000
0.375	0.987	102610.7	101654.6	100725.2	101101.6	101012.7	101421.0	0.014	0.060	0.625	0.040	0.000	0.000
0.417	0.988	102679.9	101675.8	100740.0	101120.4	100972.6	101437.7	0.015	0.095	0.603	0.064	-1.466	-14.610
0.458	0.989	102729.5	101685.8	100711.8	101135.1	100998.4	101452.1	0.016	0.086	0.610	0.066	-1.178	-14.740
0.500	0.989	102812.2	101689.3	100704.5	101155.2	100981.4	101468.5	0.016	0.103	0.586	0.066	-1.703	-14.091
0.542	0.990	102847.9	101690.1	100696.5	101168.8	100982.2	101477.1	0.017	0.109	0.580	0.067	-1.871	-13.913
0.583	0.990	102916.2	101709.2	100723.0	101208.8	100995.4	101510.5	0.017	0.121	0.561	0.067	-2.262	-13.481
0.625	0.991	102972.2	101684.6	100687.9	101981.8	100923.8	101450.1	0.018	0.030	0.524	0.070	0.576	-13.423
0.667	0.991	103020.7	101679.3	100683.9	101199.4	100979.1	101512.5	0.018	0.117	0.528	0.070	-2.149	-12.909
0.708	0.992	103107.1	101689.3	100689.9	101216.2	100958.0	101532.1	0.019	0.131	0.508	0.071	-2.611	-12.398
0.750	0.993	103148.0	101691.7	100702.9	101242.4	100942.3	101545.5	0.019	0.150	0.494	0.072	-3.201	-11.963
0.792	0.993	103204.1	101666.9	100694.2	101213.6	101109.2	101577.2	0.020	0.051	0.478	0.073	-0.041	-12.347
0.833	0.993	103264.8	101651.5	100724.4	101285.4	100990.1	101583.2	0.020	0.140	0.441	0.074	-2.902	-10.895
0.875	0.994	103271.2	101622.6	100742.7	101263.2	100992.8	101578.5	0.020	0.128	0.416	0.075	-2.478	-10.407
0.917	0.993	103271.2	101572.2	100796.6	101302.8	101009.7	101590.5	0.020	0.140	0.369	0.075	-2.744	-9.282
0.958	0.992	103115.1	101506.0	100876.0	101299.2	101038.4	101566.9	0.019	0.135	0.326	0.072	-2.358	-8.389
1.000	0.988	102685.4	101453.4	100986.9	101268.4	101176.6	101514.2	0.014	0.063	0.319	0.063	-0.071	-8.589

Survey Location 15

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.990	102948.6	101483.9	100838.3	101310.7	101000.3	101516.4	0.017	0.173	0.361	0.070	-3.460	-9.206
0.042	0.989	102818.3	101405.2	100944.8	101306.9	101051.9	101505.4	0.016	0.155	0.281	0.067	-2.688	-7.394
0.083	0.988	102654.1	101350.8	101046.2	101307.6	101094.4	101490.6	0.014	0.147	0.209	0.063	-2.264	-5.541
0.125	0.985	102398.5	101321.3	101110.5	101282.5	101203.6	101463.3	0.011	0.067	0.180	0.056	0.062	-4.976
0.167	0.983	102177.5	101376.0	101153.5	101251.6	101217.1	101435.1	0.009	0.037	0.240	0.050	0.645	-6.735
0.208	0.982	102058.8	101496.0	101122.7	101199.8	101210.1	101417.5	0.008	-0.013	0.466	0.048	1.524	-12.509
0.250	0.982	102099.5	101549.2	101007.5	101155.5	101167.7	101395.9	0.009	-0.014	0.616	0.040	0.000	0.000
0.292	0.983	102205.9	101625.6	100856.2	101072.2	101102.9	101372.6	0.010	-0.029	0.739	0.040	0.000	0.000
0.333	0.985	102364.0	101730.4	100789.4	101070.0	101066.3	101404.0	0.012	0.003	0.784	0.040	0.000	0.000
0.375	0.986	102454.2	101747.7	100674.9	101037.8	100999.8	101382.9	0.013	0.028	0.801	0.040	0.000	0.000
0.417	0.986	102546.4	101777.8	100646.1	101047.8	100928.8	101389.4	0.014	0.082	0.783	0.040	0.000	0.000
0.458	0.987	102609.4	101792.4	100639.3	101070.3	100968.7	101416.0	0.015	0.068	0.773	0.040	0.000	0.000
0.500	0.988	102695.8	101812.0	100594.4	101054.3	100860.3	101403.4	0.016	0.120	0.754	0.040	0.000	0.000
0.542	0.988	102748.2	101807.5	100599.8	101068.6	100901.4	101425.1	0.016	0.101	0.730	0.040	0.000	0.000
0.583	0.989	102832.9	101791.7	100585.5	101078.5	100899.2	101437.5	0.017	0.103	0.692	0.040	0.000	0.000
0.625	0.990	102916.1	101791.4	100594.8	101116.6	100909.4	101465.6	0.018	0.114	0.660	0.073	-1.765	-14.674
0.667	0.991	102991.3	101782.1	100591.9	101123.2	100918.1	101481.3	0.018	0.109	0.631	0.072	-1.811	-14.336
0.708	0.991	103042.5	101781.3	100593.8	101058.9	100915.7	101478.4	0.019	0.073	0.607	0.072	-0.950	-14.305
0.750	0.992	103093.2	101728.7	100586.3	101127.7	100852.5	101477.7	0.020	0.136	0.566	0.072	-2.817	-13.348
0.792	0.992	103134.2	101718.1	100601.2	101167.3	100882.0	101500.5	0.020	0.140	0.547	0.073	-2.946	-13.014
0.833	0.993	103177.3	101698.8	100643.7	101194.9	100908.0	101524.6	0.020	0.139	0.511	0.073	-2.916	-12.362
0.875	0.993	103220.3	101662.8	100687.8	101209.7	100856.5	101525.6	0.021	0.167	0.465	0.074	-3.786	-11.189
0.917	0.994	103270.2	101623.0	100740.0	101269.7	100933.3	101567.2	0.021	0.158	0.415	0.075	-3.425	-10.187
0.958	0.993	103266.4	101555.6	100805.7	101281.6	100933.3	101568.5	0.021	0.164	0.353	0.075	-3.460	-8.800
1.000	0.991	103007.6	101458.3	100925.1	101276.2	101017.9	101537.0	0.018	0.141	0.290	0.070	-2.372	-7.560

Survey Location 16

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.990	102724.4	101310.9	100687.4	101115.6	100837.5	101335.2	0.017	0.160	0.359	0.069	-3.047	-9.242
0.042	0.989	102617.7	101252.2	100814.9	101150.3	100925.8	101352.2	0.015	0.142	0.276	0.066	-2.274	-7.335
0.083	0.986	102395.8	101175.5	100881.8	101123.8	100940.0	101303.4	0.013	0.135	0.215	0.061	-1.934	-5.746
0.125	0.985	102160.6	101139.9	100948.8	101102.4	101029.4	101276.2	0.011	0.066	0.173	0.055	0.095	-4.773
0.167	0.983	101977.0	101230.5	100989.6	101083.2	101056.7	101267.4	0.009	0.030	0.272	0.049	0.745	-7.604
0.208	0.981	101842.7	101332.2	100964.1	101044.4	101047.7	101246.2	0.007	-0.004	0.494	0.046	1.192	-13.221
0.250	0.982	101907.0	101422.3	100891.6	100989.5	101020.9	101246.3	0.008	-0.038	0.643	0.040	0.000	0.000
0.292	0.984	102057.4	101512.0	100771.4	100929.3	100943.2	101242.7	0.010	-0.014	0.727	0.040	0.000	0.000
0.333	0.985	102171.8	101593.6	100613.1	100902.4	100880.9	101232.4	0.011	0.018	0.835	0.040	0.000	0.000
0.375	0.985	102251.5	101597.9	100541.0	100768.8	100757.8	101183.4	0.013	0.008	0.792	0.040	0.000	0.000
0.417	0.986	102307.2	101635.5	100467.5	100847.3	100778.3	101207.2	0.013	0.050	0.849	0.040	0.000	0.000
0.458	0.987	102402.1	101661.6	100455.0	100872.1	100742.9	101226.8	0.014	0.088	0.821	0.040	0.000	0.000
0.500	0.987	102468.1	101679.4	100456.7	100904.8	100791.3	101260.1	0.015	0.075	0.810	0.040	0.000	0.000
0.542	0.988	102533.3	101655.1	100410.3	100828.5	100681.0	101221.7	0.016	0.090	0.759	0.040	0.000	0.000
0.583	0.989	102649.3	101639.5	100399.4	100866.0	100719.0	101254.7	0.017	0.084	0.711	0.080	-0.826	-14.977
0.625	0.990	102699.5	101624.9	100383.8	100880.1	100722.6	101262.2	0.017	0.088	0.691	0.077	-1.050	-14.727
0.667	0.990	102772.9	101621.7	100411.4	100937.4	100780.0	101304.7	0.018	0.086	0.659	0.073	-1.164	-14.627
0.708	0.991	102847.1	101577.8	100361.1	100902.2	100698.6	101277.3	0.019	0.104	0.620	0.073	-1.769	-14.190
0.750	0.991	102892.8	101601.4	100451.1	100973.3	100777.7	101339.3	0.019	0.101	0.592	0.071	-1.684	-13.986
0.792	0.992	102917.8	101570.2	100450.5	100992.3	100771.8	101340.5	0.019	0.112	0.568	0.072	-2.035	-13.581
0.833	0.992	102958.3	101556.2	100480.3	101028.5	100785.6	101361.8	0.019	0.122	0.539	0.072	-2.349	-13.041
0.875	0.993	103037.9	101511.4	100494.0	101038.5	100794.1	101375.2	0.020	0.118	0.490	0.074	-2.217	-12.113
0.917	0.993	103082.0	101445.4	100554.3	101073.3	100798.2	101390.6	0.021	0.130	0.421	0.075	-2.561	-10.517
0.958	0.992	102960.6	101360.8	100625.2	101094.1	100843.1	101376.7	0.019	0.127	0.372	0.073	-2.260	-9.478
1.000	0.990	102732.3	101255.3	100722.1	101072.0	100911.1	101338.6	0.017	0.092	0.306	0.069	-0.959	-8.111

Survey Location 17

y/S	Cpt2	P1	P2	P3	P4	P5	Pavg	Beta	Gamma	Delta	X	PHI	PSI
0.000	0.988	102518.0	101339.1	100737.1	101100.0	100962.4	101331.3	0.014	0.093	0.406	0.063	-1.157	-10.587
0.042	0.987	102385.6	101257.4	100851.5	101133.1	101054.6	101336.5	0.013	0.060	0.309	0.060	0.006	-8.411
0.083	0.985	102214.0	101199.8	100921.9	101133.9	101089.9	101311.9	0.011	0.039	0.246	0.056	0.682	-6.877
0.125	0.983	102007.4	101211.0	101000.8	101131.8	101093.7	101289.0	0.009	0.042	0.234	0.049	0.488	-6.565
0.167	0.981	101806.9	101205.0	101019.4	101092.5	101071.5	101239.1	0.007	0.030	0.261	0.043	0.686	-7.352
0.208	0.981	101753.0	101340.2	100989.7	101078.8	101061.0	101244.5	0.006	0.028	0.551	0.042	0.024	-14.884
0.250	0.981	101803.1	101399.7	100913.1	100966.5	100986.8	101213.8	0.007	-0.028	0.661	0.040	0.000	0.000
0.292	0.982	101893.7	101567.3	100765.6	100926.6	100933.9	101217.4	0.008	-0.009	0.948	0.040	0.000	0.000
0.333	0.983	101964.9	101616.5	100661.5	100844.6	100870.5	101191.6	0.009	-0.027	0.988	0.040	0.000	0.000
0.375	0.983	102019.0	101680.3	100582.0	100826.0	100835.8	101188.6	0.010	-0.009	1.058	0.040	0.000	0.000
0.417	0.984	102088.6	101730.2	100531.3	100826.7	100847.3	101204.8	0.011	-0.019	1.085	0.040	0.000	0.000
0.458	0.985	102142.5	101731.7	100489.2	100798.6	100822.4	101196.9	0.012	-0.020	1.051	0.040	0.000	0.000
0.500	0.985	102215.6	101693.7	100491.1	100722.8	100724.6	101169.5	0.013	-0.001	0.920	0.040	0.000	0.000
0.542	0.986	102290.2	101758.6	100479.7	100836.8	100834.9	101240.0	0.013	0.001	0.974	0.040	0.000	0.000
0.583	0.986	102345.1	101765.4	100453.2	100708.3	100710.5	101196.5	0.014	-0.002	0.914	0.040	0.000	0.000
0.625	0.987	102418.7	101699.2	100469.9	100881.4	100874.0	101268.6	0.014	0.005	0.855	0.040	0.000	0.000
0.667	0.988	102468.6	101693.5	100504.1	100928.2	100911.4	101301.2	0.014	0.011	0.815	0.040	0.000	0.000
0.708	0.988	102517.6	101677.7	100505.0	100947.0	100935.5	101316.5	0.015	0.008	0.781	0.040	0.000	0.000
0.750	0.989	102579.7	101618.0	100539.0	100949.3	100934.6	101324.1	0.015	0.009	0.688	0.040	0.000	0.000
0.792	0.989	102581.6	101598.0	100562.4	100963.2	100935.6	101328.1	0.015	0.018	0.661	0.040	0.000	0.000
0.833	0.989	102640.5	101572.7	100588.0	100998.6	100962.3	101352.4	0.016	0.023	0.612	0.040	0.000	0.000
0.875	0.990	102678.1	101546.0	100590.9	101009.8	100989.4	101362.8	0.016	0.012	0.581	0.066	0.902	-14.629
0.917	0.990	102761.4	101472.7	100635.6	101054.4	101020.2	101388.9	0.017	0.020	0.488	0.067	0.949	-12.697
0.958	0.989	102661.1	101362.2	100711.7	101078.6	101046.7	101372.1	0.016	0.020	0.404	0.066	1.021	-10.731
1.000	0.987	102424.4	101287.7	100825.6	101090.2	101076.9	101341.0	0.013	0.010	0.341	0.061	1.362	-9.297

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